Rockland Green
172 Main Street
Nanuet, NY 10954

REQUEST FOR PROPOSALS

RFP 2023-02

Installation of a New 60kW Generator,

Including Electrical Service Modifications

West Nyack Transfer Station

April 18, 2023

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RECEIPT CONFIRMATION

[This form must be completed by each member of the Proposer team]

PLEASE COMPLETE AND RETURN THIS CONFIRMATION FORM WITHIN FIVE (5) BUSINESS DAYS OF RECEIVING THE RFP PACKAGE TO:

Ms. Dee Louis, Engineer II
Rockland Green
172 Main Street
Nanuet, NY 10954
Phone: (845) 753-2200 (Ext. 613)
Fax: (845) 753-2281
Email: dlouis@rocklandgreen.com

Failure to return this form may result in no further communication or addenda regarding this RFP.

Company Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Contact: _____

Phone Number: _____ Fax Number: _____

Email: _____

I have received a copy of the above noted Proposal.

_____ We will be submitting a Proposal (for RFP #2023-02)

_____ We will NOT be submitting a Proposal (please indicate reason)

I authorize Rockland Green to send further correspondence that Rockland Green deems to be of an urgent nature by the following method:

Courier Collect: _____ Mail: _____

Signature: _____

Title: _____

NOTICE TO PROPOSERS

RFP 2023-02

Installation of a New 60 kW Generator at the West Nyack Transfer Station

NOTICE IS HEREBY GIVEN THAT Rockland Green is seeking proposals for the installation of a pre-purchased 60 kW electrical generator, including new and modified electrical service for existing facilities at the West Nyack Municipal Solid Waste Transfer Station located at 166 South Route 303, West Nyack, NY 10994.

The Request for Proposal ("RFP") document # RFP 2023-02 may be obtained from the offices of Rockland Green located at 172 Main Street, Nanuet, NY 10954. between the hours of 9:00 AM and 4:00 PM, Monday through Friday, except holidays, on or after April 18, 2023.

Sealed proposals will be received by Rockland Green until June 1, 2023 at 2:00 p.m. local time, in the offices of Rockland Green, located at 172 Main Street, Nanuet, NY 10954. Any proposals not delivered in person should be mailed to: Dee Louis, Engineer II, Rockland Green, 172 Main Street, Nanuet, NY 10954.

All proposals shall be submitted in sealed envelopes and shall be plainly marked on the outside with the statement "RFP 2023-02 " with the Proposer's name and the title of the RFP. The attention of the Proposers is directed to the applicable federal, state, and local law requirements and to the "Affidavit of Non-Collusion" in the proposal forms. Rockland Green encourages the fullest possible utilization of minority and women's business enterprises (M/WBE's).

By order of

Rockland Green

172 Main Street

Nanuet, New York 10954

By: Gerard M. Damiani, Jr., Executive Director

I. PURPOSE OF RFP

The Rockland County Solid Waste Management Authority d/b/a Rockland Green is issuing this Request for Proposals ("RFP") to companies who are interested in providing the services described herein.

II. BACKGROUND

Rockland Green is a public benefit corporation organized and existing under the laws of the State of New York. Rockland Green's administrative offices are located at 172 Main Street Nanuet, NY 10954. Rockland Green's purpose, as reflected in its mission statement, is to "serve the people of Rockland County well by providing needed solid waste management services in order to protect and enhance our environment in a high quality, ethical, courteous, timely and cost-effective manner." Rockland Green owns and operates multiple facilities that handle various types of waste streams. These facilities include a biosolids co-composting facility; a materials recovery facility; three transfer stations consisting of the Bowline Transfer Station, the West Nyack (Clarkstown) Transfer Station, and the Hillburn Transfer Station; three leaf composting facilities consisting of the Hillburn Yard Waste Composting Facility, the Clarkstown Yard Waste Composting Facility which produces compost and mulch, and the French Farms leaf composting facility; a concrete and asphalt crushing operation; a household hazardous waste facility; and a recyclables drop off area. All facilities are located within the County of Rockland but within three separate towns.

III. SCOPE OF SERVICES SUMMARY

Rockland Green's objective is to enter into a contract with the selected Proposer to provide the following services:

1. Furnish and install a new concrete slab on grade for the new generator.
2. Install a new Owner-purchased 60 kW generator and Owner-purchased Automatic Transfer Switch (ATS) as shown on the contract drawings and in accordance with the technical specifications. A copy of the description of the generator and ATS purchased from Cummins is included as Attachment F.

3. Replacement of existing conductors, electrical connections, panelboards, and safety switches, in accordance with the drawings and specifications.
4. Disconnect and remove existing 200 Amp meters and replace with 300 Amp meters.
5. Furnish and install new underground conduits and conductors, complete, as shown on the drawings and in accordance with the technical specifications, including all necessary site restoration.
6. Remove abandoned wiring from underground conduit that runs from the existing substation to the scale house.
7. Install new conductors in an existing buried conduit from an existing pull box to the scale house.
8. Furnish and install a new electrical service for a future fabric covered structure as shown on the drawings.

Also be advised that construction activities will be performed while Transfer Station operations continue. All planned power disruption must be coordinated with, and approved by, Rockland Green 48 hours in advance. Proposer shall be responsible for maintaining continuous power to the Administrative Office and fueling facilities by using a portable generator (supplied by the Proposer). All work to be completed in accordance with the plans and specifications included with this RFP 2023-02.

Proposers must identify on Business Proposal Form 3, any and all of the exceptions taken to the scope of services, or any other aspect of the requirements stated in this RFP. Failure to identify such exceptions in the proposal may result in Rockland Green's rejection of the proposal.

IV. PROCUREMENT SCHEDULE

Issuance of RFP(1)	April 18, 2023
Pre-Proposal Site Visit(2)	April 27, 2023
Deadline for Clarification Questions from Proposers	May 12, 2023
Rockland Green Response to Clarification Questions	May 19, 2023
Deadline for Submittals	June 1, 2023
Award of Contract	June 22, 2023

(1) Within five (5) business days following the receipt of the RFP package, the Receipt Confirmation Form found at the front of this RFP must be completed and returned to Rockland Green as indicated thereon.

(2) Pre-Proposal site visit will be held at 3:00 p.m. at the West Nyack Transfer Station located at 166 South Route 303, West Nyack, NY 10994.

(3) Proposals are due no later than 2:00 p.m. on the Proposal due date. One (1) original and three (3) hard copies of each Proposal shall be submitted in a single envelope, bearing on the outside the name of the Proposer and the name of the procurement.

V. CONSTRUCTION SCHEDULE

Time is of the essence for completion of construction activities. It is Rockland Green's intent to maintain a full level of service (ongoing operations) at the Transfer Station during the active construction period and access to the Transfer Station will be shared. Coordination will be necessary for some work activities which may include vehicle routing and truck scale access. Coordination with Rockland Green is expected to ensure that transfer station operations will not be disrupted. In addition, Proposers are advised that Rockland Green's Office Trailer includes critical computer system functions that must stay powered with a portable backup power supply to be provided by Proposer. However, the intent is to optimize the duration of construction activities so that full operational services may be restored as soon as possible.

Please note that Rockland Green has already received the ATS and the 60kW generator from Cummins is scheduled for shipment on or about November 10, 2023. Proposers shall complete all work activities that can be done in advance of the delivery of the 60 kW generator and anticipate a return visit to the site to complete installation of the generator and related electrical system connections. All work shall be included with the Proposer's price and no additional compensation will be allowed for remobilization to the site to install the generator.

Construction activities shall not begin until Proposer has completed or received the following:

1. A fully executed Contract, including all required forms, bonds, and proof of insurance.
2. A written Notice to Proceed from Rockland Green that will formally establish contract dates based on the specified contract duration periods noted below, with initiation from the date of Notice to Proceed to establish the date for Substantial Completion.
3. Submittal of a Construction Progress Schedule as described in the specifications, including expected delivery time for electrical accessories with greater than a two week delivery time.
4. Submittal of a written Schedule of Values(s) for all lump sum price item.
5. Submittal of a written schedule (tabular list) for all shop drawing submittals, including prioritization of key submittals where rapid review(s) are requested.
6. Written receipt of all shop drawing approvals from the Authority's Engineer.
7. Delivery of all equipment and other temporary facilities associated with mobilization of work crews.

Once Rockland Green is satisfied that the above conditions have been met, Rockland Green will issue a written **Notice to Commence Work** that will initiate construction activities. The Contract dates will be established as follows:

Notice of Award	June 23, 2023
Contract Date (Contract Execution)	Within 14 Calendar Days of Notice of Award
Notice to Proceed	Within 5 Calendar Days of Contract Date
Date of Substantial Completion	90 Calendar Days from Notice to Proceed Date

Date of Final Completion	30 Calendar Days from Date of Substantial Completion

If Proposer believes there will be a delay in delivery of some materials or equipment, they shall immediately inform Rockland Green in writing documenting reasons for the delay. Shipping delays will not automatically be a justification for a modification to the contract times.

VI. QUESTIONS

All questions concerning this RFP must be submitted in writing by the deadline in the schedule above, to Dee Louis at dlouis@rocklandgreen.com. Rockland Green will respond to all questions submitted prior to the deadline set forth above.

VII. PROPOSAL SUBMISSION REQUIREMENTS

This section contains instructions regarding the required content and organization of the Proposals. All Proposers must provide all required information in the order set forth below. Rockland Green reserves the right to add or delete specific items from the final award or to negotiate modifications to specific items prior to such award.

Proposals must be received by the deadline in the schedule above. Proposals received after the deadline will be late and ineligible for consideration. Each proposal shall be prepared simply and economically avoiding the use of elaborate promotional materials beyond those sufficient to provide a complete, accurate, and reliable presentation. Rockland Green is not interested in receiving marketing brochures, generic narratives, or laundry lists of unrelated experience in the response.

One (1) original and three (3) copies of the proposal shall be submitted. One copy must be clearly marked “original” and must contain all original executed copies. Late proposals will be considered non-responsive and may be returned to the Proposer unopened. NO PROPOSAL will be accepted unless filed on or before the date and at the place designated herein. When sent by mail, the sealed Proposal, marked as above, shall be enclosed in an additional envelope similarly marked and addressed to the person stipulated in the Notice to Proposers. Proposals received

prior to the time of opening will be securely kept unopened. Proposals received thereafter will be returned unopened.

All hard copy submittals must be delivered by-hand, regular mail or by a nationally recognized express mail carrier to Rockland Green at the address listed below. The package or box must be clearly marked on the outside with the proposer's name and the statement "Response to RFP-2023-02 Enclosed". The response shall be typed or printed on 8-1/2 inch by 11-inch paper, with a minimum font size of 12.

Proposals shall be submitted with the Proposal Forms set forth in this RFP. All blank spaces for Proposal prices shall be properly filled in, in ink, or typed, in both words and figures. In case of any price shown in words and its equivalent shown in figures do not agree, the written words shall be binding on the Proposer. All Proposal Forms included in this RFP must be completed and submitted with all blank spaces for Proposal prices filled in with the Proposal amount in order to be considered a responsible Proposer.

All submittals become the property of Rockland Green and will not be returned.

VIII. STATEMENT OF RIGHTS AND GENERAL PROCUREMENT CONDITIONS

This RFP constitutes only an invitation to provide a proposal to Rockland Green. This section describes Rockland Green's responsibilities, rights, and options as they relate to various business, legal, and financial aspects of the procurement. Rockland Green reserves, holds and may at its sole discretion, exercise the following rights and options with respect to this RFP. By responding to this RFP, proposers acknowledge and consent to the following conditions relative to the RFP process.

1. This RFP does not obligate Rockland Green to contract for any services whatsoever.
2. All costs incurred by a proposer in connection with responding to this RFP, the evaluation and selection process, and any negotiations entered into with Rockland Green will be borne by the proposer, and with the express understanding that no claim can be made for reimbursement from Rockland Green for any associated costs.
3. Rockland Green has the right to cancel this RFP without issuing another RFP.

4. Rockland Green reserves the right to select and enter into negotiations with the proposer(s) who best satisfies the interests of Rockland Green and is most responsive to the RFP, and not necessarily on the basis of price or any other single factor.
5. Any and all responses not received by the deadline for receipt of proposals may be rejected and returned unopened in Rockland Green's sole discretion.
6. Rockland Green may select and enter into negotiations with one or more, or none of the proposers whose response best satisfies the interests of Rockland Green and to discontinue and resume such negotiations at any time prior to execution of an agreement.
7. Rockland Green reserves the right to determine in Rockland Green's sole discretion which, if any, proposers are responsive and deemed qualified, and at any time to determine that any or all proposers will not be selected for further consideration.
8. Rockland Green reserves the right to eliminate any proposer who submits an incomplete and inadequate response or is not responsive to the requirements of this RFP.
9. Rockland Green may reject non responsive submissions without evaluation, but also has the right, in its sole discretion, to waive any technicalities, immaterial irregularities or minor noncompliance.
10. Rockland Green reserves the right to reject, for any reason, any and all proposals and components thereof and to eliminate any and all proposers responding to the RFP from further consideration for this procurement.
11. Rockland Green reserves the right to issue additional requests and/or amendments to this RFP and to cancel this RFP at any time.
12. Rockland Green reserves the right to conduct investigations of the proposers and their responses to this RFP and to request additional evidence to support the information included in any such response.
13. Rockland Green reserves the right to conduct interviews with representatives from proposers.

14. Rockland Green reserves the right to conduct clarification discussions, at any time, with one or more proposers, request additional information, and to receive questions from proposers and provide answers as it deems appropriate.
15. Rockland Green reserves the right to modify deadlines.
16. Rockland Green reserves the right to enter into agreements for only portions of the services contemplated by the responses submitted or not to enter into any agreement[s].
17. Neither Rockland Green, its staff, its representative, nor any of its consultants will be liable for any claims or damages resulting from the solicitation, collection, review, or evaluations of responses to this RFP.
18. Rockland Green reserves the right to enter into concurrent or sequential negotiations with two (2) or more proposers.
19. No contract awarded by Rockland Green shall be binding and valid until fully executed by the parties.
20. Rockland Green reserves the right to designate, at any time, one (1) or more proposers with whom it may select to have a full evaluation of their proposal.
21. If a site visit is required, Rockland Green reserves the right to waive the site visit on a case-by case basis.
22. The proposals will constitute formal offers to Rockland Green that are binding on the proposer for 180 calendar days from the submittal date of the proposal.

Minority and Women's Business Enterprises

Rockland Green encourages the fullest possible utilization of Minority and Women Owned Business Enterprises.

Authority to Do Business in New York

Any entity formed under the laws of the State of New York must provide a certificate of good standing from the New York Secretary of State, and any entity not formed under the laws of the State of New York must provide a certificate of authority from the New York State Secretary of

State to do business in New York in accordance with Article 13 of the New York Business Corporation Law.

No Discrimination

The proposers shall not discriminate against employees or applicants for employment because of race, creed, color, national origin, sex, sexual orientation, age, disability, military status, predisposing genetic characteristics, or marital status and will undertake or continue existing programs of affirmative action to ensure that minority group members and women are afforded equal employment opportunities without discrimination.

Confidentiality

The New York State Freedom of Information Law, Public Officers Law, Article 6, Sections 84-90 provides for public access to government records. However, proposals may contain trade secrets and other technical, financial, or administrative data whose public disclosure could cause substantial injury to the proposer's competitive position. Proposers must clearly indicate whether there are portions of their proposals that contain trade secrets and other technical, financial, or administrative data whose public disclosure could cause substantial injury to the proposer's competitive positions. Accordingly, to protect the proposer from release of this sensitive information under the State Freedom of Information Law, the proposer should specifically identify and mark the pages of its submittal(s) that contain such information and insert the following notice in the front of its submittal:

Notice

The data on pages [_____] of this proposal identified by an asterisk (*) contain technical or financial information, which are trade secrets and/or whose disclosure would cause substantial injury to the proposer's competitive position. The proposer requests that such data be used only for the evaluation of the proposal but understands that the disclosure will be limited to the extent that Rockland Green considers proper under the law. If

an Agreement is entered into with this proposer, Rockland Green shall have the right to use or disclose the data, as provided in the Agreement, unless otherwise obligated by law.

Rockland Green does not assume any responsibility for disclosure or use of marked data for any purpose. In the event properly marked data are requested, pursuant to the State Freedom of Information Law, the proposer will be advised of the request and may expeditiously submit to Rockland Green a detailed statement indicating the reasons it has for believing that the information is exempt from disclosure under the law. This statement will be used by Rockland Green in making its determination as to whether disclosure is proper under the law.

Correction, Modification, or Withdrawal of Proposal

A proposer may correct, modify, or withdraw a proposal by written notice received by Rockland Green prior to the time and date set for the receipt of proposals. For any proposals received by Rockland Green, Rockland Green may elect to waive minor informalities or may elect to allow the proposer to correct them.

Record of Proposals

All proposals are the property of Rockland Green and will not be returned. Rockland Green will use its best efforts to prevent the unauthorized disclosure of proprietary information, provided same is properly identified in accordance with this RFP. In no event will Rockland Green assume liability for any loss, damage, or injury, which may result from any disclosure or use of marked data within proposals.

Security Bond

A security bond or certified check in the amount of $5,000 (five thousand dollars) made payable to Rockland Green must accompany the proposal. The bond shall provide that prior to the expiration or termination of the bond, the proposer shall (1) if so, requested by Rockland Green, negotiate an agreement with Rockland Green, and (2) if Rockland Green selects the proposer's

proposal as the most advantageous proposal, enter into a contract. If the proposer fails to comply with the above, the surety will pay to Rockland Green, as liquidated damages, the full amount of the security bond or, as applicable; the certified check shall become the property of Rockland Green and be deposited in Rockland Green's accounts.

Any security bond must be valid for at least 180 days from the proposal submission date. If the contract has not been executed prior to the expiration of the security bond, Rockland Green may require the renewal of the security bond for an additional 180 days. No proposal will be considered unless it is accompanied by the required certified check or security bond. The form of the Security Bond and Surety Letter of Intent, which must be submitted, is described in Business Proposal Form 5.

The certified check or security bond submitted by a proposer will be returned within ten (10) business days after the earliest to occur of (1) the rejection of the proposal of such proposer by Rockland Green and (2) the execution of the contract by and between Rockland Green and the selected proposer.

Labor and Materials Payment Bond

A Labor and Materials Payment Bond shall be provided to Rockland Green for 100% of the value of the work and in accordance with "Business Proposal Form 5" in Appendix A.

Independent and Separate Prices

Where separate prices are required by this RFP for specific services, such prices are understood to be independent and separable. Accordingly, elimination or modification by Rockland Green of any portion of the proposed scope of services should not affect the price proposed for any other portion of the scope of services. Rockland Green will reserve the right after contract award to modify the scope of services within the limits of applicable law.

Sales Tax

The New York State Tax Law exempts from sales and use taxes, imposed under Article 28 and pursuant to Article 29 thereof, the sale or use of tangible property incorporated in structures, buildings, or real property owned by an exempt organization. Rockland Green is an exempt organization, and therefore, proposers should not include sales and use tax in their proposals.

Insurance

Proposer shall possess or be able to obtain all insurance such as, Professional Liability Insurance, Commercial General Liability/Auto, and Workmen's Compensation Insurance, and other types of coverage, as indicated in the Insurance Requirements found in Appendix B to this RFP

Labor, Wages, and Equal Employment Opportunity.

Proposer will be expected to be familiar with and to comply with all Federal, State, and local labor laws, rules, regulations, ordinances, and executive orders, including without limitation, requirements for minimum wages, prevailing wages and benefits, workmen's compensation, and equal employment opportunity.

Affirmative Action.

Proposer must also agree to comply with the affirmative action requirements of County Resolution 471 of 1975 if the proposer (1) employs a minimum of fifteen (15) employees and (2) does a minimum of fifty thousand dollars ($50,000) per annum business with Rockland County. See Business Proposal Form 8.

IX. SUMMARY OF SCOPE OF SERVICES

Install a new 60kW generator and Automatic Transfer Switch furnished by Rockland Green and complete all related and additional electrical work at the West Nyack Transfer station in accordance with the plans and specifications included with this RFP 2023-02 .

X. QUALIFICATIONS AND EXPERIENCE

Proposers must provide the following information for the Proposer**:**

- A summary of your company's experience in providing the services requested herein.
- A list projects of a similar nature and scope completed by the proposer in the past 5 years (minimum of 3 projects).
- Contact information for listed references, including project size, completion date, and any other relevant details for completed projects.
- The name of the Project Superintendent and Project Foreman assigned to be on site and their related experience. Experience of other key personnel may be requested by Rockland Green as part of the evaluation process.
- Upon request by Rockland Green, provide additional information related to qualifications to clarify or supplement the qualifications information requested in Appendix A of this RFP.
- Financial Information
- Evidence of Authorization to conduct business in the State.
- Evidence that demonstrates the ability to obtain the required insurance set forth herein.

XI. COMPENSATION

The selected Proposer shall invoice Rockland Green on or before the tenth (10^{th}) calendar day of each month after commencement of services, but no more frequently than once monthly. The selected Proposer may submit a payment request for the period ending the last calendar day of the previous month. Payment Request shall be in such format and include whatever supporting information as may be reasonably required by the Engineer. In its Payment Request, the selected Proposer may request payment for ninety percent (90%) of that portion of the Contract Price allocable to the Contract Services that have been properly provided, including labor, materials and equipment properly incorporated in the Work, and materials or equipment necessary for the Work and properly stored at the

Project Site (or elsewhere if offsite storage is approved in writing by the Engineer), less the total amount of previous payments received from Rockland Green

Proposers must complete the price proposal form attached as Price Proposal Form 1.

XII. CONTENTS OF PROPOSALS

Proposers are required to submit with their proposals all the information, documentation, and Forms requested in this RFP. The proposal must be organized as follows; details on each of the items below are provided after this section:

(i) Cover Letter and Security Bond

(ii) Acknowledgement of responsiveness to this request for proposal (in cover letter), including the following.

a. The Proposer has reviewed and fully understands the scope of work, sequencing of work, and timing for the project.

b. The proposer has provided the requested information relative to qualifications and experience.

(iii) Qualifications and Experience

(iv) General Requirements

(v) Proposal Forms

(vi) Evidence of Proposer's ability to obtain the required insurance, if selected.

(vii) All comments, if any, to the draft Agreement, included with this RFP, if any

(viii) Evidence of Proposer's ability to obtain the required Labor and Material Bond, if selected.

(ix) A certificate of good standing or authority from the New York State Secretary of State to do business in New York in accordance with Article 13 of the New York Business Corporation Law.

The Proposal Cover Letter is the proposer's official letter transmitting the complete proposal to Rockland Green. The format required for the Proposal Cover Letter is provided in Table 10-1 below. The letter is to be written in text form and is not to exceed three (3) pages, typed, and double-spaced. Since the Proposal Cover Letter introduces the proposer to Rockland Green, it should clearly and concisely summarize the proposal. This letter is to be typed on the proposer's letterhead and is to be signed by the Proposer's Chief Executive Officer ("CEO") and attested by another officer of the proposer. If the proposer is a joint venture, the CEO of the lead or sponsoring proposer is to sign the letter.

Table 10-1

FORMAT OF PROPOSAL COVER LETTER

A. Addressee	Dee Louis, Engineer II Rockland Green 172 Main Street Nanuet, New York 10954
B. Content of Letter	First Paragraph:
	• Name of Proposer (or Proposers, if joint venture) submitting the Proposal. • If a joint venture, the name of the lead or sponsoring Proposer. • Confirm that the signatory is authorized to make the Proposal. Second Paragraph:
	• Response to the requirement for a Security Bond, which must be enclosed. Third Paragraph:
	• A brief description of the Proposer(s). • Summarize qualifications of the Proposer(s). • Commitment of the Proposer(s) to deliver the services required in the Request for Proposals and described in the attached Proposal and at the prices quoted in the Proposal. Fourth Paragraph:
	• Commitment of the Proposer to enter into an Agreement with Rockland Green at the prices stated in the Proposal. Fifth Paragraph:
	• Acknowledgement of responsiveness to the Request For Proposals Very truly yours, President/CEO Attachment: Security Bond or certified check Certificates of Insurance Surety Statement for Labor & Material Bond Certificate New York Secretary of State

(i) Scope of Services

Proposers must address all aspects of the scope of services described in this RFP. The proposer must acknowledge an understanding of and a commitment to meeting all the responsibilities and obligations stated in this RFP.

(ii) Qualifications and Experience

a. Qualifications.

The proposer must demonstrate qualifications consistent with the minimum qualifications described in Section X of this RFP.

b. Experience.

The proposer must demonstrate experience consistent with the requirements described in Section X of this RFP.

(iii) Proposal Forms

All proposals must include at least one (1) complete set of Business, Price, and Technical Proposal Forms, as applicable, completed by the proposer.

XIII. PROPOSAL EVALUATION

This section describes Rockland Green's proposal evaluation process and criteria. Rockland Green will evaluate the net total and net present value costs of each proposal and the proposer's ability and willingness to meet all of the proposer's responsibilities. Each section of a proposal will be evaluated in terms of the commitments made, the completeness and the reliability of the approach taken, and conformance with the requirements and the instructions provided in this RFP. A proposer's failure to adequately respond to all of the technical and pricing requirements in this RFP, to accurately complete the Proposal Forms, to disclose violations of applicable laws, codes or regulations, or to provide other business-related information required in the RFP, shall be grounds to deem a proposal as non-responsive.

Selection will not be solely based on the lowest cost, although cost will be a factor in the evaluation process.

After evaluating the proposals, Rockland Green may short-list proposers for interviews and enter into contract negotiations with one (1) or more proposers who meet(s) Rockland Green's evaluation criteria and whose proposals are regarded as most advantageous to Rockland Green.

a. Evaluation Team

The proposal evaluation and selection process described in this Section will be conducted by an evaluation team led by Rockland Green. The team may consist of personnel from Rockland Green and its technical, legal, and financial consultants. The team will review and evaluate proposals and select one (1) or more proposers with whom Rockland Green will conduct negotiations.

b. Cost Evaluation

The Price Proposal will be evaluated on the basis of the fees proposed by the proposer in all Proposal Forms. Proposers are strongly advised to submit pricing wholly consistent with the RFP, then to clearly delineate any caveats or exceptions to baseline pricing.

c. Requests for Clarification

Once proposals have been reviewed, Rockland Green may request that the proposer submit additional information or clarify certain aspects of the proposal.

d. Proposal Interviews

After proposals have been evaluated according to the process described above, the evaluation team may choose to meet with and interview the proposers who submitted the most advantageous proposal(s). Following the interviews, Rockland Green may select the proposer(s) with whom to conduct contract negotiations.

APPENDIX A

PROPOSAL FORMS

BUSINESS PROPOSAL FORM 1

SIGNATURE PAGE

To the Rockland County Solid Waste Management Authority d/b/a Rockland Green:

The Proposer, in compliance with your Request for Proposals for [_____ _____], having examined the Request for Proposals and being familiar with all conditions surrounding the project , hereby proposes to furnish all labor, equipment, materials and supplies necessary to meet the obligations of the proposal in accordance with the solicitation, within the time and prices set forth therein.

Proposer understands that Rockland Green reserves the right to reject any or all proposals and to accept any item or items in any one proposal and to waive any informalities in the RFP process.

Respectfully Submitted:

_____
Printed Name / Signature

_____
Date

_____
Title

_____
Business Address

(Seal, if corporation)

BUSINESS PROPOSAL FORM 2

ADDENDA ACKNOWLEDGEMENT FORM

The undersigned hereby acknowledges receipt of the following Addenda (if any) to the Request for Proposals for **Installation of New 60 kW Generator, including Electrical Service Modifications, West Nyack Transfer Station, RFP-2022-02:**

Addendum No.	Date
_____	_____
_____	_____
_____	_____
_____	_____

Person, firm, or corporation submitting this Proposal:

_____
Contractor

_____
Signature

_____
Title

_____
Date

BUSINESS PROPOSAL FORM 3

EXCEPTIONS TAKEN TO THIS REQUEST FOR PROPOSALS

____ No exceptions taken.

____ Exceptions taken (please provide cross references, as shown below):

Request for Proposal Page _____, Section _____

Exception taken: _____

_____

_____

_____
Printed Name / Signature

_____
Title

_____
Date

BUSINESS PROPOSAL FORM 4

FORM OF SECURITY BOND

KNOW ALL MEN BY THESE PRESENT, that we [NAME OF PROPOSER], as Principal (hereinafter the "Proposer") and [NAME OF SURETY], a [Corporation],[Partnership] duly organized under the laws of the State of _____, as Surety, are held and firmly bound unto the Rockland County Solid Waste Management Authority (the "Authority"), as Obligee, in the sum of [_____] ($[ ]) lawful money of the United States of America to be paid to Rockland Green, its successors or assigns, for which payment, well and truly to be made, we bind ourselves, our successors and assigns, jointly and severally, firmly by these present, and

WHEREAS, the above-named Proposer has submitted or is about to submit to Rockland Green a proposal to provide [_____] as described in the Request for Proposals (RFP [ ]), dated [_____](the "RFP"), issued by Rockland Green and covered by the Proposal submitted by the Proposer in response thereto, which Proposal is made a part hereof.

NOW THEREFORE, the Surety hereby understands that if the above-referenced Proposer is selected by Rockland Green as the most advantageous Proposer, then the Proposer will enter into an Agreement based on its proposal within the time specified in the RFP or any extension thereof agreed to in writing by Rockland Green. Surety hereby agrees that if the Proposer shall fail to do so, Surety will pay to Rockland Green, as liquidated damages, the full amount of this Bond within thirty (30) calendar days after receipt by the Proposer and Surety of written notice of such failure from Rockland Green, which notice shall be given with reasonable promptness, identifying this Bond, and including a statement of the amount due. Upon execution of the Agreement, this Bond shall thereafter become null and void, otherwise to remain in full force and effect unless terminated as hereinafter provided.

It is agreed that this Bond shall become effective on the date the Proposal is submitted and will continue in full force and effect for three hundred sixty-five (365) days from such date of submittal (unless extended for up to an additional three hundred sixty-five (365)) or until terminated, as hereinafter provided.

If the Proposal is not accepted within the time specified in the RFP, or any extension thereof agreed to in writing by Rockland Green, then after written notice by Rockland Green of such non-acceptance, this Bond may be terminated by the Surety or Proposer upon written notice to each other and to Rockland Green by registered mail at least ten (10) days prior to the termination date specified in such notice. Upon the giving of such notice, Surety shall be discharged from all liability under this Bond for any act or omission of the Proposer occurring after the date of the notice of non-acceptance.

Any suit or action under this bond shall be commenced only in a court of competent jurisdiction located in the State of New York.

IN WITNESS WHEREOF, Surety and Proposer, intending to be legally bound hereby, do each cause this Security bond to be duly executed on its behalf by its authorized officers, agent or representative.

Signed and sealed this _____day of _____, _____.

SURETY	PROPOSER
[NAME OF SURETY]	[NAME OF CONTRACTOR]
Name:_____	Name:_____
Signature:_____	Signature:_____
Title:_____	Title:_____

BUSINESS PROPOSAL FORM 5

SURETY LETTER OF INTENT

(To be typed on Surety's Letterhead)

General Counsel
Rockland Green
172 Main Street
Nanuet, NY 10954

Dear General Counsel:

_____ (the "Proposer") has submitted herewith a Proposal in response to Rockland Green's ("Rockland Green") Request for Proposals ("RFP") for Installation of a New 60 kw Generator at the West Nyack Transfer Station. The RFP requires the selected Proposer to enter into an agreement to provide services consisting of listed in Section III of RFP#2023-02, and to comply with all applicable permits, licenses, approvals and other Applicable Law; and perform the other related and ancillary responsibilities set forth in the RFP.

The Surety has reviewed the Proposer's Proposal and the form of Performance Bond issued with the RFP, which will form the basis of the Service Contract. The Surety hereby certifies that if Rockland Green elects to require such security, it intends to issue on behalf of the Proposer as security for performance under the Service Contract, an Operations Performance Bond substantially in the form attached to the RFP and equal to one (1) year of the annualized gross Service Fee, for the benefit of Rockland Green in the event the Proposer is selected for final negotiations and execution of the Service Contract.

_____
Name of Surety

_____
Name of Authorized Signatory

_____
Title

_____
Signature

BUSINESS PROPOSAL FORM 6

CONTRACTOR QUALIFICATIONS

This form must be completed by each member of Proposer team.

(Section C must be signed before a Notary Public)

A. General Information

1. ***Firm: _____

2. Address: _____

3. Telephone: _____

4. Contact Person: _____

5. Type of Organization (e.g., a corporation; joint venture; partnership; and individual):

_____

6. Name of Parent Company, if any: _____

7. Name of Affiliate Companies, if any: _____

8. ***Identity of Joint Venture Partners, if any: _____

9. Financial References: _____

10. New York Surety: _____

11. Signature of person duly authorized to submit on behalf of the Proposer

_____
Signature

_____
Title

***** Referred to in Proposal Forms individually and collectively as "Proposer." Information requested must be provided with respect to each party to the Proposal.

BUSINESS PROPOSAL FORM 6 (Continued)

CONTRACTOR QUALIFICATIONS

B. Business Information

1. Brief history of Proposer(s) involved in the Proposal (attach additional sheets as necessary):

_____

_____

2. Name and address of all partners, key shareholders, principals and/or owners:

_____

_____

3. Has Proposer ever failed to complete any contract awarded to it? _____

4. If so, where and why: _____

_____

5. Has any officer or partner of Proposer ever been an officer or partner of some other organization that failed to complete a contract? _____

_____

6. If yes to #5, state name of individual, other organization, reason, and bonding company: _____

_____

7. In what other lines of business is Proposer directly or indirectly involved? _____

_____

8. With what individual or entities have you been associated as partner or otherwise during the past five (5) years?

_____

BUSINESS PROPOSAL FORM 6 (Continued)

CONTRACTOR QUALIFICATIONS

9. Describe the principal and any secondary nature of your current business: _____

_____

_____

10. State the length of time you have been in that business under your present name and identify all other names under which you have done business: _____

_____

11. Has any individual, partner, shareholder, principal, owner or affiliate of your firm been the subject of administrative or judicial action for an alleged violation of environmental or public health laws or regulations? If so state the details and disposition. _____

_____

_____

12. Are you, your partners, joint venturers, parent corporation or subsidiaries a party to any legal actions that may affect your ability to perform the obligations described in your Proposal? If so, identify these actions: _____

_____

13. Have you, any partner, key shareholder, principal, owner or affiliate of your firm been the subject of any criminal conviction(s) indictment(s) or investigation(s)? If so, state the details:

_____

_____

14. Are you, your partners, joint venturers, parent company or subsidiaries a party to or subject to any threatened or pending litigation, either civil or criminal? If so state the details: _____

_____

BUSINESS PROPOSAL FORM 6 (Continued)

CONTRACTOR QUALIFICATIONS

15. List any and all civil penalties, judgments, consent decrees or other sanctions within the last five (5) years, as a result of a violation of any law, rule, regulation or ordinance in connection with its business activities, by the Proposer, any affiliate of the Proposer, or any key shareholder, officer or director of the Proposer or any affiliate thereof.

_____

_____

16. List any and all current investigations, indictments or pending litigation by any Federal, State or local jurisdiction of the Proposer, any affiliate of the Proposer or any key shareholder, officer or director of the Proposer or any affiliate thereof.

_____

_____

17. List any and all actions occurring within the last five (5) years which have resulted in revocation or suspension of any permit or authority to do business in any Federal, State or local jurisdiction, by the Proposer, any affiliate of the Proposer, or any key shareholder, officer or director of the Proposer or any affiliate thereof.

_____

_____

18. List any and all actions occurring in the past five (5) years that have resulted in the barring from public bidding by the Proposer, any affiliate of the Proposer, or any key shareholder, officer or director of the Proposer or any affiliate thereof.

_____

_____

19. List any bankruptcy proceedings in the past five (5) years by the Proposer, any affiliate of the Proposer, or any shareholder, officer or director of the Proposer or any affiliate thereof. _____

_____

20. List the names, addresses, and telephone numbers, and contact name of municipalities or other organizations, which have utilized your services:

_____

_____

21. List the names, addresses and telephone numbers, and contact name of municipalities for whom you have provided services of the same nature as those contemplated in this RFP:

_____

_____

22. Please attach a description of the services you provide(d) for each reference municipality, including the term of your agreement with each such municipality:

_____

23. For the past three (3) years, have any of the reference projects in this RFP been the subject of administrative or judicial action for an alleged violation of environmental or public health laws or regulations? If so, state the details and disposition: _____

_____

C. <u>Financial Information</u> (To be signed before a Notary Public)

Attach financial statements, prepared on an accrual basis, in a form which clearly indicates the Proposer's assets, liabilities and net worth over the most recent three (3) year period or as many years as your firm has been in business if less than three (3) years.

Dates of financial statements: _____

Name(s) of firms(s) preparing statements: _____

Dated this ___ day of _____, 20___

_____

(Print or Type Name of Proposer)

(Seal, if corporation)

By:_____

Title:_____

_____ being duly sworn, deposes and says that the financial statement(s) referenced above are a true and accurate statement of Proposer's financial condition as of the date hereof; and all of the foregoing qualification information is true, complete and accurate.

Sworn to before me this ____ day of _____, _____

_____
Notary Public

BUSINESS PROPOSAL FORM 7

STATEMENT OF NON-COLLUSION

In accordance with applicable law, all proposals and contracts awarded or accepted by a municipality must contain a Statement of Non-collusion. By submission of this Proposal, the Proposer certifies that:

Each Proposer and each person signing on behalf of any Proposer certifies, and in the case of a joint Proposal, each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his knowledge and belief:

(a) The prices in this Proposal have been independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition as to any matter relating to such prices with any other proposer or with any competitor.

(b) Unless otherwise required by law, the prices which have been quoted in this Proposal have not been knowingly disclosed by the Proposer and will not knowingly be disclosed by the Proposer prior to opening, directly or indirectly, to any other proposer or to any competitor.

(c) No attempt has been or will be made by the Proposer to induce any other person, partnership or corporation to submit or not to submit a proposal for the purpose of restricting competition.

(d) The person signing this Proposal certifies that he has fully informed himself regarding the accuracy of the statements contained in this certification under the penalties of perjury, affirms the truth thereof such penalties being applicable to the Proposer, as well as to the person signing on its behalf.

(e) If a corporation, the attached hereto is a certified copy of the resolution authorizing the execution of this certificate by the signature of this Proposal on behalf of the corporate Proposer.

BUSINESS PROPOSAL FORM 7 (Continued)
STATEMENT OF NON-COLLUSION

Resolved that _____ (**Name of Individual**) be authorized to sign and submit the Proposal of _____for the _____ _____ and to certify as to non-collusion required by applicable law as the act and deed of such corporation and for any inaccuracies or misstatements in such certificates this corporate Proposer shall be liable under the penalties of perjury.

_____
Signature and Title

Sworn to before me this _____day of _____, _____

_____
Notary Public

BUSINESS PROPOSAL FORM 8
DISCLOSURE STATEMENT

(Proposer must sign this form before a Notary Public)

STATE OF NEW YORK)
) ss
COUNTY OF _____)

I, _____, _____
(NAME) (TITLE - Officer of Corporation, Partner or Principal)

being duly sworn depose and swear under the penalties of perjury:

1. That, in connection with the above Proposal or Agreement for the _____ _____ , no other person will have any direct or indirect interest in this Proposal except:

_____
(In case of corporations, all officers of the corporation and stockholders owning more than 5% of the corporation stock must be listed. Use attached sheet if necessary.)

2. That _____ related to any officer
(I am not) (none of the officers or stockholders are)

or employee of Rockland Green except_____

_____

3. There is not any state or local officer or employee or a member of Rockland Green interested in such application.

_____
Signature and Title

Sworn to before me this _____ day of _____, _

_____
Notary Public

BUSINESS PROPOSAL FORM 9

AFFIRMATIVE ACTION PLAN

(Proposer Must Sign This Form Before a Notary Public)

STATE OF NEW YORK)
) ss:
COUNTY OF ROCKLAND)

_____ being duly sworn, deposes and says that he/she is the _____ of _____. That *I do (do not) employ fifteen (15) employees and *I do (do not do) a minimum of $50,000 per annum business with the Rockland County Solid Waste Management Authority d/b/a Rockland Green.

Based on the above information, attached hereto is an Affirmative Action Plan or, because of the above, no Affirmative Action Plan is necessary.

Sworn to before me this ___ day of _____, ____.

_____
Notary Public

* strike out non-applicable information.

BUSINESS PROPOSAL FORM 10
FOIL ACKNOWLEDGEMENT FORM

The Proposer hereby acknowledges and recognizes that the New York State Freedom of Information Law, Public Officers Law, Article 6, Sections 84-90 provides for public access to government records. However, Proposals may contain trade secrets and other technical, financial, or administrative data whose public disclosure could cause substantial injury to the Proposer's competitive position.

Please indicate whether your Proposal contains trade secrets and other technical, financial or administrative data whose public disclosure could cause substantial injury to your competitive position by marking the applicable below.

_____ The Proposal DOES contain trade secrets and other technical, financial or administrative data whose public disclosure could cause substantial injury to our competitive position, and we have clearly marked pages in our Proposal containing such information in accordance with Section 1.6 of the RFP.

_____ The Proposal DOES NOT contain trade secrets and other technical, financial or administrative data whose public disclosure could cause substantial injury to your competitive position.

Person, firm or corporation making this Proposal:

_____
Proposer

_____
Signature

_____
Title

_____
Date

BUSINESS PROPOSAL FORM 11
PROPOSER QUESTIONS

(All questions pertaining to this solicitation must be submitted in writing.)

Please use this form and email it (dlouis@rocklandgreen.com) **to the attention of Dee Louis**. Rockland Green will respond to all questions submitted prior to the cut-off date indicated in the RFP.

Date:_____

Proposer Name:_____

Proposer Company:_____

Phone:_____ Fax:_____

Question(s):_____

BUSINESS PROPOSAL FORM 12

DISCLOSURE OF CONTRACTOR RESPONSIBILITY STATEMENT

(This form must be completed by each member of the Proposer team)

1. List any criminal investigations, indictments, or convictions of any person, subsidiary or affiliate of the Proposer arising out of obtaining or attempting to obtain a public or private contract or subcontract, or in the performance of such contract or subcontract.

2. List any indictments, convictions or ongoing investigations of any person, subsidiary, or affiliate of this Proposer for offenses such as embezzlement, theft, fraudulent schemes, etc. or any other offense indicating a lack of business integrity or business honesty which affect the responsibility of the Proposer.

3. List any convictions or civil judgments under state or federal antitrust statutes.

4. List any violations of contract provisions such as knowingly (without good cause) to perform, or unsatisfactory performance, in accordance with the specification of a contract.

5. List any prior suspensions or debarments by any government agency.

6. List any contracts not completed on time.

7. List any documented violations of federal or state labor laws, regulations or standards, or occupational safety and health rules.

I, _____, as _____,
(Name of Individual) (Title and Authority)
of _____, declare under oath that the
(Proposer Name)

above statements, including any supplemental responses attached hereto, are true.

_____
Signature

Subscribed and sworn to before me on this ___ day of _____, _____ ,

by_____, representing him/herself to be _____ of the Proposer.

_____
Notary Public

PRICE PROPOSAL FORM

RFP-2023-02: Installation of a New 60kW Generator, including Electrical Service Modifications, West Nyack Transfer Station

Proposer shall perform the Work in accordance with the Contract Documents for the prices shown in the Price Proposal Summary shown below.

Proposer acknowledges that Proposer's price(s) constitute Proposer's sole compensation for performing all Work required by the Contract Documents, and if a particular part of the Work is not listed specifically in the Price Quote Summary set forth below in Schedule A of this section, Proposer shall include that part of the Work in the Cost Item Description which it most logically belongs.

Schedule A: Lump Sum Cost Items:

Lump sum items include all Work in the Contract Documents, except items specifically identified as Unit Price Work.

Measurement and payment of Lump Sum Cost Items is defined in Section 01026, Lump Sum Items, of the Technical Specifications (if applicable) and Rockland Green's Contract Terms and Conditions.

Lump Sum Cost Items Table:

Item No.	Estimated Quantity	Units	Description	Total Item Price (Figures in Dollars and Cents)
A-1	**1**	**LS**	**Install New 60 kW generator and ATS, and Furnish and Install All Other Electrical Service Modifications, including Mobilization/Demobilization, Return Mobilization for Generator Installation, Concrete Pad for Generator, and Site Restoration, complete, all in accordance with manufacturer's recommendations and this RFP 2023-02** (See description of work included in specification section 01026)	

(Continued on Next Page)

Schedule B: Total Proposal Price:

Determination of the Total Proposal Price will be determined as follows.

a. In case of discrepancy between the correct sum of individual bid items and the (incorrectly) calculated sum, the correct sum of individual cost items will govern.

Proposer shall complete the shaded Total Proposed Price section in Schedule B. The shaded areas are used to delineate the total proposed price, which is the summation of all total prices shown in Schedule A.

Schedule	Total Proposed Price – Summation of All Total Price Items Identified in Schedule A (Figures in Dollars and Cents)
TOTAL PROPOSAL PRICE: (Sum of Schedule A)	

Total Proposed Price (In Words):

_____

_____

_____

_____

Name _____

Signature _____

Company Name _____

Date _____

APPENDIX B
INSURANCE REQUIREMENTS

Prior to the start of the Agreement and throughout the term thereof, the Contractor will obtain and pay for will, independent of any insurance the Contractor may possess for other projects, file and maintain with the insurance coverage listed below.

(a) Worker's compensation insurance and disability benefits liability insurance required by New York State law covering all of the employees of the Contractor at the Facility.

(b) Employer's liability insurance required by New York State law covering all the employees of the Contractor at Rockland Green's Facility.

(c) Commercial general liability and property damage insurance with broad form blanket contractual liability and products completed operations coverage, with combined single limit for bodily injury, and for property damage with limits of not less than one million dollars ($1,000,000) per occurrence and two million ($2,000,000) in the aggregate on a per project basis.

(d) Commercial Comprehensive automobile liability insurance endorsed for any automobile with limits of one million dollars ($1,000,000) combined single limit.

(e) Excess liability insurance above the required comprehensive general, automobile and employer's liability insurance in the amount of five million dollars ($5,000,000).

(f) All risk physical damage insurance (including terrorism) covering loss, damage, or destruction to the Facility in an amount equal to the full replacement value of the Facility, but not less than two million dollars ($2,000,000) with no co-insurance provision and subject to the following maximum deductibles:

Earthquake and Flood – Twenty-five thousand dollars ($25,000)

All Other Perils – Ten thousand dollars ($10,000)

(g) Pollution liability insurance with limits not less than five million dollars ($5,000,000).

2. Additional Insureds. The Contractor will name Rockland Green, the County, and their officers, agents, employees, Rockland Green Engineer, and consultants as additional named insureds on a primary, non-contributory basis (the "Additional Insureds") on all insurance policies required herein, other than paragraphs 1. (a.) and 1. (b.).

The Contractor to the Agreement will waive the subrogation rights of its various insurance carriers in favor of the other Authority.

3. Insurance Certificates and Policies. Insurance and any renewals thereof will be evidenced by certificates of insurance (the "Certificates") and copies of all insurance policies issued or countersigned by a duly authorized representative of the issuer and delivered to Rockland Green for its approval thirty (30) days prior to the start of services or, in the case of a renewal, as reasonably provided by the insurer. The Certificates will require thirty (30) days written notice to Rockland Green, of cancellation, intent not to renew, or reduction in its coverage by the insurance company.

4. Non-Recourse Provision. All insurance policies will provide that the insurers will have no recourse against the Additional Insureds for payment of any premium or assessment and will contain a severability of interest provision in regard to mutual coverage liability policies. The coverages provided by mutual coverage liability insurance policies required pursuant to the Agreement will be the primary source of any restitution or other recovery for any injuries to, or death of persons, or loss or damage to property incurred as a result of an action or inaction of the Contractor or its subcontractors, of their respective suppliers, employees, agents, representatives, or invitees, that fall within these coverages and also within the coverages of any liability insurance or self-insurance program maintained by Rockland Green.

5. Deductibles. All deductibles will be agreed upon by the Contractor and Rockland Green if different from those shown in paragraph 1 above and payment of the deductibles will be by the Contractor. There will be no deductibles for any of the liability insurance provided in paragraph 1 hereof.

6. Subcontractors. The Contractor will be responsible for ensuring that all subcontractors which are engaged by the Contractor to perform any part of the services secure and maintain all insurance coverages under paragraphs 1. (a.), (b.), (c), (d.), and (e.) above and other financial sureties required by applicable law in connection with their presence and the performance of their duties.

7. Specific Provisions for Comprehensive General Liability Insurance. Comprehensive General Liability insurance, as required under paragraph 1. (c.), will include premises-operations, blanket contractual, products and completed operations, personal injury, host liquor liability, explosion, collapse, underground hazards, and broad form property damage, including completed operations and independent contractor's coverages.

8. Specific Provisions for Worker's Compensation Coverage. Worker's Compensation insurance must be in accordance with the requirements of New York law, as amended from time to time. The required worker's compensation insurance will include other State's coverage, voluntary compensation coverage, and federal longshoreman and harbor worker's coverage.

9. Specific Provisions for All Risk Physical Damage Insurance. Coverage for all risk physical damage required under paragraph 1. (f.) will be on an all risk basis and will protect against loss of, damage to, and destruction of the Facility. Such insurance will also cover loss, damage, or destruction caused by flood, earthquake, and volcanic eruption, provided that earthquake and volcanic eruption insurance may have sublimits equal to the lesser of five million dollars ($5,000,000) or the full replacement value of the Facility. All policies obtained may be subject to normal exclusions relating to nuclear risks, war risks, terrorism, and such other perils as are generally imposed by insurers on similar properties.

10. Changes in Insurance Coverage. The insurance listed herein are the minimum coverages permitted, except that Rockland Green may decrease or omit the coverages specified in paragraph 1. (e.) at any time in its sole discretion, and may decrease the coverage specified in paragraph 1. (c.) hereof to the extent it is not available on commercially reasonable terms. If Rockland Green decreases such coverage, any cost savings will be credited to the benefit of Rockland Green.

11. Qualifications of Insurers. The Contractor is required to obtain the insurance set forth in this RFP with insurance companies that carry a Best's "A" or equivalent rating. In addition, insurance must be obtained and maintained with insurers authorized to do business in the State of New York.

12. Cost of Insurance. If Rockland Green chooses to arrange for the insurance outlined herein, Rockland Green may elect to obtain such insurance, provided that:

    (a) Written notice is received by the Contractor at least ninety (90) days prior to the contract year during which Rockland Green will assume this responsibility or ninety (90) days prior to the expiration date of the insurance placed by the Contractor.

(b) Rockland Green may at any time during the term of the Agreement, upon ninety (90) days written notice prior to any Contract Year, require the Contractor to assume the responsibility to obtain the Required Insurance.

(c) Rockland Green pays any cancellation penalty (or short-rate) arising out of canceling the insurance coverage provided by the Contractor provided coverage required in this RFP, prior to its expiration date.

(d) The Contractor reduces its Base Fee in proportion to the costs of the insurance the Contractor has been providing to.

APPENDIX C
PREVAILING WAGES

PRC#
2023004192

APPENDIX D

TECHNICAL SPECIFICATIONS

Appendix D: Technical Specifications
For
Rockland Green
RFP 2023-02: Installation of New 60 kW Generator, Including Electrical Service Modifications
West Nyack, New York

PREPARED BY:

Environmental Design & Research, Landscape Architecture,
Engineering & Environmental Services, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202

2023

TABLE OF CONTENTS
(Appendix D – Technical Specifications)

TECHNICAL PROVISIONS

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project - Work covered by Contract Documents.

B. Limits of work area.

C. Construction permits and easements.

D. Work sequence.

E. Quality assurance.

F. Preconstruction conference.

G. Progress meetings.

H. Coordination with ongoing operations.

1.02 RELATED SECTIONS

Agreement – Contract for Installation of a New Standby Generator, Including Electrical Service Modifications at the West Nyack Transfer Station

A. Rockland Green RFP 2023-02 Agreement (Appendix G)

B. Section 01019 – Contract Considerations

C. Section 01026 – Lump Sum Items

1.03 WORK INCLUDED

A. The Proposer shall furnish and install materials, equipment, and labor for the following items, all in accordance with the drawings, specifications, and requirements of RFP-2023-02.

1. Work shall generally consist of, but is not limited to, the following:

a. Excavate and install new conduit and conductors.

b. Replace existing conductors serving the scale house.

c. Install new concrete slab for generator, complete.

d. Install new 60 kW Diesel Generator and Automatic Transfer Switch (both furnished by Rockland Green).

e. Splice in new 300 Amp meter to the existing panelboard and into the remote generator annunciator panel.

f. Remove existing 200 Amp meter and the connecting feeders to the utility line.

g. Furnish and install a new electrical service to a proposed fabric covered structure location, complete with disconnect switch.

h. Site restoration

1.04 LIMITS OF WORK AREA AND ONGOING OPERATIONS

A. Confine construction operations within the Contract Limits shown on the Drawings. Storage of equipment and materials, or erection and use of sheds outside of the Contract Limits, if such areas are the property of Rockland Green, shall be used only with Rockland Green's approval. Such storage or temporary structures, even within the Contract Limits, shall be confined to Rockland Green's property and shall not be placed on properties designated as easements or rights-of-way. Staging of materials shall be coordinated with Rockland Green. All roadways and access to the transfer station shall remain open and clear from obstruction while operations are active.

B. It is Rockland Green's intent to maintain ongoing operations at the Transfer Station during the active construction period. Proposer shall always maintain clear and free vehicular access to the transfer station unless specifically approved by the Rockland Green with 24-hour notification and request.

C. All planned power disruption shall be coordinated with, and approved by, Rockland Green 48 hours in advance. Proposer shall be responsible for maintaining continuous power to the Administrative Office and fueling facilities by using a portable generator furnished and maintained by the Proposer.

1.05 CONSTRUCTION PERMITS AND EASEMENTS

A. The Proposer shall obtain and pay for necessary construction permits from those authorities or agencies having jurisdiction over land areas, utilities or structures which are located within the Contract Limits, and which will be occupied, encountered, used, or temporarily interrupted by Proposer's operations.

B. When construction permits are accompanied by regulations or requirements issued by a particular authority or agency, it shall be Proposer's responsibility to familiarize himself and comply with such regulations or requirements as they apply to his operations on this project.

1.06 WORK SEQUENCE

A. Time is of the essence for completion of construction activities. It is the Authority's intent to maintain a full level of service (ongoing operations) at the Transfer Station during the active construction period. Coordination will be necessary for some work activities which may include vehicle routing and scale access. Coordination with Rockland Green is expected to ensure that transfer station operations will not be disrupted- normal hours of operation at the transfer station are as follows:

1. West Nyack Transfer Station: Monday – Friday, 7:00 am – 4:00 pm; Saturday, 7:00 am – 12:00 pm.

B. Rockland Green has already received the ATS and the 60kW generator from Cummins is scheduled for shipment on or about **November 10, 2023.** Proposers shall complete all work activities that can be done in advance of the delivery of the 60 kW generator and anticipate a return visit to the site to complete installation of the generator and related electrical system connections. All work shall be included with the basic services and no additional compensation will be allowed for remobilization to the site to install the generator.

C. Construction activities shall not begin until Proposer has completed or received the following:

1. A fully executed Contract, including all required forms, bonds, and proof of insurance.

2. A written Notice to Proceed from Rockland Green that will formally establish contract dates based on the specified contract duration periods noted below, with initiation from the date of Notice to Proceed to establish the date for Substantial Completion and Final Completion.

3. Submittal of a written Schedule to indicate sequencing of work.

4. Submittal of a written Schedule of Values that provides sufficient detail for tracking the progress of work, including labor and material breakout, and backed-up with whatever supporting information Rockland Green may reasonably request.

5. Written receipt of all shop drawing approvals from the Authority's Engineer.

6. Delivery of all equipment and other temporary facilities associated with mobilization of work crews.

7. Authorization to proceed with work from Rockland Green.

1.07 QUALITY ASSURANCE

A. The entire Contract work shall be completed in strict accordance with all applicable federal, state and local regulations and ordinances and the best standards of practice.

1.08 PRECONSTRUCTION CONFERENCE

A. Engineer will schedule a conference after the Effective Contract Date.

B. Attendance Required - Rockland Green, Engineer, Proposer, and each major subcontractor (if applicable).

C. Agenda

1. Distribution of extra sets of Contract Documents.

2. Submission of list of Subcontractors, list of products, Schedule of Values, and progress schedule.

3. Designation of personnel representing the parties in Contract and the Engineer.

4. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders and Contract closeout procedures.

5. Scheduling.

6. Requirements of regulatory agencies.

7. Use of premises by Rockland Green and Proposer.

8. Temporary facilities to be provided by Rockland Green.

9. Procedures for testing.

10. Procedures for maintaining record documents.

11. Periodic cleanup of site.

12. Notification of utilities' Owners.

D. Engineer will record minutes and distribute copies within 5 days after meeting to participants, and to those affected by decisions made.

1.11 PROGRESS MEETINGS

A. Engineer will schedule and administer meetings throughout progress of the Work as required based on schedule submitted by the Proposer or as desired by Rockland Green.

B. Engineer will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies within five days to participants, and those affected by decisions made.

C. Attendance Required - Rockland Green, Engineer, Proposer's job superintendent, major Subcontractors and suppliers, as appropriate to agenda topics for each meeting.

D. Agenda

1. Review minutes of previous meetings.

2. Review of Work progress.

3. Field observations, problems, and decisions.

4. Identification of problems that impede planned progress.

5. Review of submittals schedule and status of submittals.

6. Review of off-site fabrication and delivery schedules.

7. Maintenance of progress schedule.

8. Corrective measures to regain projected schedules.

9. Planned progress during succeeding work period.

10. Coordination of projected progress.

11. Maintenance of quality and work standards.

12. Effect of proposed changes on progress schedule and coordination.

13. Other business relating to Work.

1.12 COORDINATION WITH ONGOING OPERATIONS

A. Rockland Green's facility must be always maintained in continuous operation during the course of the work under this Contract.

B. The Proposer is advised of the following work that may present interferences or require significant coordination and interfacing. This list is provided for information only and may not be complete.

1. Any power disruption to the Administration Office and Fueling Station.

2. Access to the existing truck scale.

C. The costs associated with the interferences, coordination, and interfacing with the transfer station operator as well as Rockland Green shall be included in the Contract Price.

PART 2 PRODUCTS

Recommended product data sheets and manufacturers information are included in this specification.

PART 3 EXECUTION

All installation procedures shall be in accordance with the manufacturer's recommendations for the specified product and this RFP 2023-02.

END OF SECTION

SECTION 01019

CONTRACT CONSIDERATIONS

PART 1 GENERAL

A. **The contract considerations described under all Division 1 specifications are intended to serve as "Supplementary Conditions" to Rockland Green's Standard Terms and Conditions described in the Contract as executed between Rockland Green and Proposer. In all cases, Rockland Green's Standard Terms and Conditions shall have precedence over all other terms and conditions described in these Division 1 specifications.**

1.02 DESCRIPTION OF WORK

A. Schedule of Values.

B. Applications for Payment.

C. Change procedures.

D. Alternates.

1.03 RELATED SECTIONS

Agreement – Contract for Installation of a New Standby Generator, Including Electrical Service Modifications at the West Nyack Transfer Station

A. RFP 2023-02 Agreement (Appendix G)

B. Specification Section 01010 – Summary of Work

C. Specification Section 01300 – Submittals

D. Specification Section 01400 – Quality Control

E. Specification Section 01500 – Construction Facilities and Temporary Controls

1.04 DEFINITIONS

A. Mobilization - Mobilization includes, but is not limited to, performance of preparatory construction operations, including the movement of personnel and equipment to the project site; application, fee payment, and acquisition of all required permits (i.e., erosion and sediment control plans, temporary and permanent building and trade permits, utility connections, etc.); and the establishment of Engineer's and Proposer's offices, buildings, and other facilities required at the site in order to begin work on a substantial phase of the contract. The cost of insurance and bonds.

1.05 SCHEDULE OF VALUES

A. Refer to Section 5.2 of the Contract Terms and Conditions with Rockland Green (the Agreement).

B. Submit one electronic copy in Microsoft Excel of the Schedule of Values prior to beginning

construction activities.

C. The sum of all line items in the Schedule of Values shall equal the Total Proposal Price included on the Price Proposal Form plus authorized Additive Alternatives (if any) as listed in the Agreement.

D. Each line item shall include a directly proportional amount of the Proposer's overhead and profit.

E. Schedule of Values shall serve as a breakdown of Work used to establish progress payments. Progress payments for lump sum items will be made based on the percentages of completion of the work items included in the Schedule of Values for each lump sum item. Progress payments for Unit Price Work will be based on actual quantities of work performed. Progress payments for Contingent Unit Price work will only be made if work is authorized by Rockland Green and Engineer.

F. For Lump Sum Proposal Items, the following format shall be followed when developing the Schedule of Values.

1. If Mobilization is not identified in the Price Proposal Form as a separate Proposed Price Item, Proposer shall include in the Schedule of Values a line item for Mobilization as part of a Lump Sum Proposal Price Item.

a. Lump sum line item shall include all work described in the definition of mobilization included herein, including the installation of the new generator

b. Costs for bonds and insurance shall be included in the lump sum mobilization line item.

c. Mobilization cost shall not be greater than five percent of the Total Proposal Price.

2. Include separate line items for demobilization and contract closeout.

3. Format - Show cost breakdown for each lump sum item. Include, as a minimum, mobilization and demobilization and cost for materials.

G. Revise Schedule of Values to include executed Change Orders with each Application for Payment.

1.06 APPLICATIONS FOR PAYMENT

A. Refer to the CONTRACT FOR THIS RFP 2023-02 (Agreement).

1.07 CHANGE PROCEDURES

A. Refer to the CONTRACT FOR THIS RFP 2023-02 (Agreement).

1.08 ALTERNATES – Not Used.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01026

LUMP SUM ITEMS (PROPOSED PRICE ITEM DESCRIPTIONS)

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Price basis.

B. Elements of Proposed Price Item Description page.

C. Lump sum item list.

D. Proposed Price Item Descriptions.

1.02. PRICE BASIS

A. Lump sum prices bid by Proposer are deemed to be full compensation for all required labor, products, tools, equipment, plant, transportation, testing, inspection, services, incidentals, administrative, procedures, applicable taxes, permit fees, overhead, profit, and other miscellaneous expenses.

1.03. ELEMENTS OF PROPOSED PRICE ITEM DESCRIPTION PAGE

A. Identification of lump sum item, as set forth in the Proposal Form.

B. Statement of work involved in the item.

C. Listing of components of work which make-up the item including reference to the section(s) covering each component.

D. Cross-references to associated work not included in the item.

1.04. LUMP SUM ITEMS FOR RFP 2023-02

Bid Item No.	Bid Item Description
A-1	Install New 60 kW generator and ATS, and Furnish and Install All Other Electrical Service Modifications, including Mobilization/Demobilization, Return Mobilization for Generator Installation, Concrete Pad for Generator, and Site Restoration, complete, all in accordance with manufacturer’s recommendations and this RFP 2023-02

1.05 PROPOSED PRICE ITEM DESCRIPTIONS

A. Proposed Price Item Description pages identified above are attached at the end of this section.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

(continued)

PROPOSED PRICE ITEM DESCRIPTION A-1

INSTALL NEW 60kW GENERATOR AND ATS, AND FURNISH AND INSTALL ALL OTHER ELECTRICAL SERVICE MODIFICATIONS, COMPLETE

A. DESCRIPTION

Under this item, Proposer shall provide all labor, materials, and equipment (rented and owned) necessary to Install New 60 kW generator and ATS, and Furnish and Install All Other Electrical Service Modifications, including Mobilization/Demobilization, Return Mobilization for Generator Installation, and Site Restoration, complete in accordance with the plans and specifications included with this RFP 2023-02. Work shall include, but is not limited to the following:

- Mobilization/demobilization, return mobilization for generator installation, shop drawing submittals, bonds, insurance, contract considerations, site preparation, site health and safety precautions, including personal protective equipment (PPE), and any other items needed in support of completing the work.
- Excavate the existing abandoned underground electrical line and install a new underground electrical line which will be rerouted to provide emergency electrical power to the West Nyack office building, fueling station, and the weigh station.
- Furnish and install a concrete pad (complete) for the new generator as shown on the drawings
- Install new 60kW electrical generator and Automatic Transfer Switch (ATS) in accordance with manufacturers recommendations and as shown on the drawings and further described in the Technical Specifications and the Cummins purchase summary (Appendix F of RFP 2023-02).
- Furnish and install all electrical components and systems as shown on the Contract Drawings and further described in the Technical Specifications
- Provide proper excavation and installation procedures for all electrical components in accordance with the National Electric Code (NEC) and manufacturer's recommendations.
- Coordinate with Cummins to complete startup and generator testing in accordance with manufacturer recommendations and as described in the Technical Specifications
- Coordinate work activities with the existing transfer station operations and Rockland Green.
- Final site cleanup and restoration
- Specified warranties, as applicable

B. WORK INCLUDED UNDER THIS ITEM

Rockland Green RFP 2023-02, complete
Contract Drawings and Specifications
Remobilization for generator installation

C. ASSOCIATED WORK NOT INCLUDED UNDER THIS ITEM

All Other Bid Items

D. METHOD OF PAYMENT

Measurement shall be based on the completion of all activities including labor, equipment, and materials necessary to complete specified construction work. Progress payments will be based on an

approved schedule of values for the work items listed under the summary of work.

Perform the work as shown on Contract Drawings and as directed by Rockland Green and Engineer.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittal procedures.

B. Construction progress schedule

C. Proposed products list.

D. Shop drawings.

E. Substitutions

F. Manufacturers' instructions.

1.02 RELATED SECTIONS

A. Agreement – Contract for Installation of a New Standby Generator, Including Electrical Service Modifications at the West Nyack Transfer Station

B. Section 02030 – Demolition
Section 03200 – Concrete Reinforcement
Section 03300 – Cast In Place Concrete
Section 03370 – Concrete Curing and Protection

1.03 SUBMITTAL PROCEDURES

A. Transmit each required submittal using Rockland Green. and Engineer-accepted form.

B. Sequentially number the transmittal forms. Resubmittals shall have original number with an alphabetic suffix.

C. Identify project, Proposer, subcontractor, or supplier; pertinent Drawing sheet and detail number(s), and specification section number, as appropriate.

D. Apply Proposer's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction work, and coordination of information, is in accordance with the requirements of the work and Contract Documents. Stamp shall show the following information:

1. Shop Submittal Number: _____

2. Deviations: None_____; As Listed_____

3. Reference Specification Number: _____

4. Reference Drawing Number: _____

5. Space Requirement: As Designed _____ Different, As Listed _____

6. Representation is made to Rockland Green and Engineer that the Proposer has determined and verified all field measurements and quantities, field construction criteria, materials, catalog numbers and similar data, that he has reviewed and coordinated the information in each shop drawing with the requirements of the work and the Contract Documents, and hereby approves this submittal.

   Proposer_____

   Signature_____

   Date_____

E. All submittals shall be submitted through electronic submission system. All submittals shall be in PDF format. All files shall be combined into a single bookmarked file for easier review.

F. Schedule submittals to expedite the Project and deliver to Engineer via email (jway@edrdpc.com). Coordinate submission of related items. Proposer shall anticipate that submittals will be reviewed within 7 calendar days. Proposer shall consider the submittal review time in their schedule and plan accordingly. **No work shall proceed under this RFP 2023-02 until all shop drawings have been approved.**

G. Identify deviations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed work.

H. Identify space requirements which differ from those designed or shown on the Contract Documents.

I. Revise and resubmit shop drawings as required until accepted by Engineer. Identify all changes made since previous submittal in a cover letter or memorandum. Rockland Green reserves the right to recover cost for engineering review time from the Proposer if there are more than one resubmittal for any given shop drawing.

J. Distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

K. Submittals not requested will not be recognized or processed.

1.04 CONSTRUCTION PROGRESS SCHEDULE

A. Submit preliminary progress schedule in duplicate within 10 days after effective date of Agreement for Rockland Green and Engineer review.

B. Submit finalized progress schedule at least 10 days before submission of the first Application for Payment.

C. Submit revised schedules at each progress meeting, identifying changes since previous version.

D. Show complete sequence of construction by activity, identifying work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

E. Indicate estimated percentage of completion for each item of work at each progress

meeting.

1.05 PROPOSED PRODUCTS LIST

A. Within 10 days after date indicated in the Notice to Proceed, submit complete list of major products proposed for use (if applicable), with name of manufacturer, trade name, and model number of each product, and appropriate specification section number.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.06 SHOP DRAWINGS

A. Electronic copies of shop drawings are allowed but must contain a complete submittal. Multiple email submissions for the same submittal will be returned as “not reviewed”.

B. After review and approval by Engineer, distribute and preserve copies for record documents purposes.

1.07 SUBSTITUTIONS

A. Substitutions may be considered when a product becomes unavailable through no fault of the Proposer. Furnish evidence that product is unavailable.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

C. A request constitutes a representation that the Proposer:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.

2. Will provide the same warranty for the substitution as for the specified product.

3. Will coordinate installation and make changes to other work which may be required for the work to be complete with no additional cost to Rockland Green.

4. Waives claims for additional costs or time extension which may subsequently become apparent.

5. Will reimburse Rockland Green the costs incurred by Rockland Green for review and any subsequent redesign services by Engineer, including Engineer's revisions to the Contract Documents, and Engineer's assistance in connection with review by authorities when re-approval is required, if Engineer determines that the item of material or equipment proposed by Proposer is a substitute item.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

E. Submittal Procedures

1. Submit to Engineer three copies of request for substitution for consideration, limiting each request to one proposed substitution.

2. Each request shall basically conform to the procedures outlined in Article 1.03 of this section.

3. Include shop drawings, product data, and certified test results attesting to the proposed product equivalence.

4. The Engineer will notify Proposer, in writing, of decision to accept or reject request.

1.08 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections or on the drawings, submit manufacturers' printed instructions for delivery, storage, assembly, installation, startup, adjusting, and finishing, in quantities specified for product data.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Quality assurance and control of installation.

B. References and standards.

C. Tolerances.

D. Tests and inspections.

E. Manufacturers' field services.

1.02. QUALITY ASSURANCE AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply fully with manufacturers' instructions.

C. If manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.

D. Comply with specified standards as a minimum quality for the work except when code requirements or equipment manufacturer requires more stringent standards.

E. Perform work by persons qualified to produce workmanship of specified quality.

F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion and disfigurement.

G. Employ skilled and experienced installer to perform cutting and patching.

H. Submit written request in advance of cutting or altering elements which may affect:

1. Structural integrity of element.

2. Integrity of weather-exposed or moisture-resistant elements.

3. Efficiency, maintenance, or safety of element.

4. Visual qualities of sight-exposed elements.

5. Work of Rockland Green or separate Proposer.

I. Execute cutting, fitting, and patching, including excavation and fill, to complete work and to:

1. Fit the several parts together, to integrate with other work.

2. Uncover work to install or correct ill-timed work.

3. Remove and replace defective and non-conforming work.

J. Execute work by methods which will avoid damage to other work, and provide proper surfaces to receive patching and finishing.

K. Cut rigid materials using masonry saw or core drill.

L. Restore work with new products in accordance with requirements of Contract Documents.

M. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

N. Identify any hazardous substance or condition exposed during the work to Rockland Green and Engineer in writing for decision or remedy. Refer to the Contract Drawings and specifications for work associated with potentially contaminated soil.

1.03. REFERENCES AND STANDARDS

A. For products and workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified and/or are required by applicable codes.

B. Obtain copies of standards where required by individual specification sections.

C. If specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

1.04. TOLERANCES

A. Monitor fabrication and installation tolerance control to produce acceptable work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. If manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

1.05. TESTS AND INSPECTIONS

A. Rockland Green shall employ and pay for the services of an independent testing laboratory to perform inspections, tests, and approvals, as applicable.

B. Independent testing laboratory will:

1. Perform inspections, soil compaction and concrete tests, and other services specified in the individual specification sections and as required by Engineer and Rockland Green.

2. Prepare and submit reports to the Engineer indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents. Engineer will forward copy of report(s) to Proposer.

C. Proposer shall:

1. Cooperate with independent firm; furnish samples of materials; furnish design mix, equipment, tools, storage and assistance as requested.

2. Notify Engineer and Rockland Green 24 hours prior to expected time for operations requiring services.

3. Provide weekly look-ahead schedules for testing needs.

D. Retesting required because of non-conformance to specified requirements shall be performed, on instructions by the Engineer, by the same independent firm which performed the initial tests and inspections.

E. Costs for retesting and re-inspection will be deducted from progress payments to Proposer.

1.06. MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, material or product suppliers or manufacturers shall provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment and demonstration and training as applicable, and to initiate instructions when necessary.

B. Staff person to report observations, site conditions, or instructions given to applicators or installers, that are supplemental or contrary to manufacturers' written instructions

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Continuity of operations.

B. Temporary utilities

C. Temporary barriers.

D. Other temporary site controls

E. Construction facilities.

1.02. CONTINUITY OF OPERATIONS

A. Storage of equipment and materials, or erection and use of sheds, shall be coordinated with Rockland Green and Facility Operator. Such storage or temporary structures shall be confined to Rockland Green's property and shall not be placed on properties designated as easements or rights-of-way. All roadways and access to the Facility shall remain open and clear from obstruction while operations are active.

B. It is Rockland Green's intent to maintain ongoing operations at the Facility during the active construction period and access to the Facility will be shared. Proposer shall always maintain clear and free vehicular access to the Facility.

1.03. TEMPORARY ELECTRICITY

A. Proposer may connect to existing electrical power service as long as connections and equipment do not interfere with ongoing operations. Proposer's power consumption shall not disrupt Rockland Green's need for continuous service.

1.04. TEMPORARY LIGHTING

A. Proposer shall provide and maintain temporary lighting to achieve sufficient lighting in the work space for safe and effective work. The cost for all temporary lighting shall be borne by the Proposer.

B. Available site lighting may be utilized during construction in accordance with Rockland Green site-specific requirements.

1.05. TEMPORARY HEATING

A. Temporary heating is not required, however if the Proposer needs to provide temporary heat for curing of concrete products and /or sealants it shall be the sole responsibility of the Proposer to provide all costs associated with temporary heat.

1.06. TELECOMMUNICATIONS SERVICE

A. Proposer shall provide, maintain, and pay for telecommunications service to its field office for the duration of the contract.

1.07. TEMPORARY WATER SERVICE

A. Proposer may utilize existing water supply system at the facility.

B. Rockland Green will pay cost of water used. Exercise measures to conserve water.

C. Proposer shall provide sufficient potable quality drinking water for its employees at the project site.

1.08. TEMPORARY SANITARY FACILITIES

A. Proposer is allowed to use existing sanitary facilities on site. Any damages or misuse caused by Proposers personnel will be the responsibility of the Proposer to make appropriate repairs or clean up as needed to the satisfaction of Rockland Green.

1.09. TEMPORARY BARRIERS

A. Protect vehicles, stored materials, site, and structures from damage.

B. Supplement barriers with suitable signs, railings, and night lights, as necessary to conform with governing authorities and regulations.

1.10. PROTECTION OF INSTALLED WORK

A. Proposer shall protect installed work from damage and deterioration due to ongoing construction activities.

B. Control activity in immediate work area to minimize damage.

C. Rockland Green reserves the right to order additional protective measures be taken beyond those proposed by Proposer, to safeguard the existing facilities and Work at no additional cost to Rockland Green.

1.11. SECURITY

A. Each Proposer shall maintain a daily sign-in sheet for his workers and subcontractors.

B. Proposers shall utilize existing on-site roads for project access and construction traffic. Coordinate with Rockland Green.

1. Roads shall be free for use by all personnel involved in project and be adequate for transportation of persons, materials, equipment, and products to construction area.

1.12. PARKING

A. When site space is not adequate, Proposer shall provide additional off-site parking.

1.13. PROGRESS CLEANING

A. Proposer shall maintain areas free of waste materials, debris, and rubbish. Maintain site and structures in a clean and orderly condition.

1.14. REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Proposer or subcontractor responsible for temporary utilities, facilities, and controls shall remove temporary utilities, equipment, facilities, controls, materials, prior to Substantial Completion.

B. Remove temporary barriers, enclosures, etc. in concert with completion of those segments of work which no longer require such measures.

C. Clean and repair damage caused by installation or use of temporary work.

1.15. PROPOSER'S FIELD OFFICE

A. At the Proposer's discretion.

1.16. ENGINEER'S FIELD OFFICE

A. Not required.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01700

CLOSEOUT AND RECORD DOCUMENTS

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Closeout procedures.

B. Record documents.

1.02. RELATED SECTIONS

Agreement – Contract for Installation of a New Standby Generator, Including Electrical Service Modifications at the West Nyack Transfer Station

A. Section 26 05 00 – Electrical Work

B. Section 26 08 00 – Testing and Inspection

C. Section 26 32 14 – Packaged Engine Generator Systems – Diesel Outdoor

1.03. CLOSEOUT PROCEDURES

A. Contract closeout procedures shall be in accordance with RFP 2023-02 and the Agreement with Rockland Green.

B. Correct or replace all defective work.

C. The following items shall be provided by the Proposer prior to Final Application of Payment:

1. Spare parts, maintenance and extra materials in quantities specified in individual specification sections. Deliver to project site and place in location as directed; obtain receipt prior to final payment.

2. Provide duplicate notarized copies of certifications for those items with extended transferable warranties beyond one year. Prepare separate submittal for each item.

3. Warranties and Bonds - Provide duplicate notarized copies of certifications for those items with extended transferable warranties beyond one year. Prepare separate submittal for each item.

1.04. RECORD DOCUMENTS

A. The following supplements the requirements of the Agreement:

1. Record, keep, and monitor up-to-date record documents of work constructed in the field. Legibly mark in red ink or red pencil to show all changes in, or directly associated with, the work of this contract. Keep entire set of record documents current on a day-to-day basis. Record documents shall be kept on hand in the

Proposer's field office and shall be available for periodic examination by Engineer upon request.

2. Examples of annotations that could occur are as follows:

   a. Unforeseen modifications to existing structures.

   b. Relocation of equipment.

   c. Changes in mechanical trades components; (electrical, heating, ventilating, plumbing).

   d. Measured location of internal utilities or mechanical trade items, which are to be concealed from view, referenced to visible and accessible features of the structure.

   e. Change in location or elevations of underground facilities installed under this Contract.

   f. Change in materials..

   g. Relocation of existing underground facilities.

B. Final Record Drawings - Provide the conduit sizes and horizontal and vertical location of all supports, fittings, panels, and other appurtenances. The information will be provided digitally in the form of an AutoCAD .dwg file, Version 2019. Proposer can request Contract Drawings in .dwg format from the Engineer. Proposer shall comply with the Owner's and Engineer's requirements in order to obtain the Drawings. Final record drawings shall be prepared in AutoCAD, Version 2018 or more recent

C. Final payment to Proposer will not be considered until acceptable record documents have been turned over to Owner.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 02030

DEMOLITION

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

A. Demolition and removal of site-related construction.

B. Demolition and removal of underground electrical line.

C. Demolition and removal of 200 Amp electrical meter.

D. The Proposer is responsible to coordinate demolition work and sequencing with all subcontractors, the Engineer, and the Owner.

1.02. RELATED SECTIONS

A. Section 01010 - SUMMARY OF WORK
B. Section 01019 - CONTRACT CONSIDERATIONS
C. Section 01300 - SUBMITTALS
D. Section 01400 - QUALITY CONTROL
E. Section 01500 – TEMPORARY CONTROLS
F. Section 02205 – PROTECTION OF EXISTING FACILITIES
G. Section 02222 - EXCAVATION
H. Section 02223 – BACKFILLING

1.03. SUBMITTALS

A. Submit under provisions of Section 01300, Submittals.

B. Proposer shall submit a demolition work plan that describes all demolition activities and temporary backup power for continuous electric service to Rockland Green’s Administrative Office and fueling station.

C. The work plan shall be reviewed by the Engineer prior to the commencement of all demolition work.

1.04. PROJECT RECORD DRAWINGS AND PHOTOGRAPHS

A. Accurately record actual locations of capped utilities, subsurface obstructions, or any other objects that are not removed and disposed of in their entirety

1.05. REGULATORY REQUIREMENTS

A. Conform to applicable codes for protection of adjacent structures, dust control, runoff control, and disposal of materials.

B. Notify affected utility companies before starting demolition operations and comply with their requirements.

C. Do not close or obstruct roadways, sidewalks, hydrants, or parking areas without required

permits.

D.

1.06. HAZARDOUS ENVIRONMENTAL CONDITIONS

A. If an unknown unforeseeable hazardous environmental condition is encountered at the site, or if Proposer or anyone for whom Proposer is responsible creates a hazardous environmental condition, immediately:

1. Secure or otherwise isolate such condition;

2. Stop all work in connection with such condition and in any area affected thereby; and

3. Notify Owner and Engineer (and promptly thereafter confirm such notice in writing).

B. Resume work in connection with such condition or in any affected area only after Owner has obtained any required permits related thereto and delivered to Proposer a written notice specifying under what special conditions work may be resumed safely.

1.07. SEQUENCING

A. Existing equipment and structures shall not be demolished or removed from service until the new replacement equipment and material necessary to construct the new structures and complete the work is on site and ready for installation. Proposer shall minimize the time that facility structures are out of service.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. PREPARATION

A. Notify Owner and Engineer at least 48 hours in advance of intended start ofdemolition operations in each affected area.

B. Provide, erect, and maintain temporary barriers, signs, and security devices as shown on the contract drawings and required by applicable building codes.

C. Protect existing structures, equipment, appurtenances, architectural features, and materials which are not to be demolished. Prevent movement or settlement of adjacent structures.

D. Protect existing site-related items such as pavements, walkways, parking areas, curbs, aprons, and landscaping features which are not to be demolished.

E. Protect existing electrical; heating, ventilating, and air conditioning; and plumbing systems, including related components, which are not to be demolished.

F. Mark location of underground utilities.

3.02. DEMOLITION REQUIREMENTS

A. Confine demolition operations within the contract limits.

B. Conduct operations to minimize interference with adjacent and occupied building areas. Maintain protected egress and access at all times.

C. Cease operations immediately if adjacent structures appear to be in danger. Notify Engineer. Do not resume operations until directed.

3.03. DEMOLITION

A. Break up and remove slabs-on-grade, pavements, curbs, aprons, etc., and related items in designated areas and as shown on the contract drawings.

B. Backfill, compact, and rough grade areas excavated, including cavities created byremoval of demolished items, in accordance with Section 02223, Backfilling.

C. Patch and refinish existing visible surfaces which are to remain in accordance with Section 2205, Protection of Existing Facilities.

D. Remove temporary barricades, partitions, signs, etc.

E. Remove and dispose of residual materials such as grit, sludge, debris, trash, and other scrap at OWNER transfer station as directed by the OWNER.

F. Upon completion of demolition operations, leave areas in a clean condition.

END OF SECTION

SECTION 02205

PROTECTION OF EXISTING FACILITIES

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Location of facilities.

B. Notification of utility owners and authorities.

C. Coordination and preparation.

D. Protection of facilities.

E. Protection of sewers and storm drains.

F. Protection of water mains, hydrants and appurtenances.

1.02 RELATED SECTIONS

Agreement – Contract for Installation of a New Standby Generator, Including Electrical Service Modifications at the West Nyack Transfer Station

A. Division 1 Specifications.

B. Division 2 Specifications.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. LOCATION OF FACILITIES

A. Prior to construction, verify location of existing underground facilities near or adjacent to project.

1. Consult with appropriate Underground Facilities Protection Organization (Dig Safely New York), owners of facilities, and arrange for field stake-out or other markings to show locations.

2. Perform exploratory excavation at key junctures and other critical points to aid in ascertaining locations.

B. Report field stake-out findings and results of exploratory excavations to Engineer if possible changes in project location or design are indicated because of suspected interferences with existing facilities. Allow Engineer sufficient time to determine magnitude of changes and to formulate instructions in that regard.

C. If location of an existing underground facility is uncertain, apply careful excavation and probing techniques during construction to locate and avoid damage to same.

3.02. NOTIFICATIONS OF OWNERS AND AUTHORITIES

A. Prior to construction, notify owners of existing facilities, including local police and fire departments servicing the facility of general scope, nature and planned progress schedule of the work.

B. Notify owners of nearby underground facilities when excavating is to take place in a particular area, allowing them reasonable time to institute precautionary procedures or preventive measures which they deem necessary for protection of their facilities.

C. When existing utilities, such as sewer, water, gas, telephone, or electric power are damaged or disturbed during construction, immediately notify affected Owner and Engineer.

D. Notify Police and Fire Departments, Rockland Green and Engineer, immediately if hazardous conditions are created or have the potential for occurring, as a result of damage to an existing facility or as a result of other activities at project site. Hazardous conditions could be created from: fire, explosion, escape of gas, escape of fuel oil, gasoline or industrial fluids, downed electrical wires, and disrupted underground electrical cables.

3.03. COORDINATION AND PREPARATION

A. Discuss anticipated work schedule with Rockland Green and Engineer at preconstruction meeting, including procedures to be followed if one or more utilities are damaged or disrupted. Develop contingency plans to address Proposer’s role in repair of damaged utilities.

B. Make preparations beforehand to repair and restore damaged utilities, including arrangements for standby materials and equipment to be promptly assembled at site and utilized immediately.

C. Adjust work schedules and personnel assignments as necessary to conform with requirements of Rockland Green if any utilities are to be temporarily interrupted during construction. Cooperate with Rockland Green in this regard to minimize the time of interruption.

D. Make preparations for and conform to applicable requirements of New York State Industrial Code Rule 53 (as amended April 1, 1975) entitled,“Construction, Excavation and Demolition Operations at or Near Underground Facilities,” issued by State Department of Labor.

3.04. PROTECTION OF FACILITIES

A. Plan and conduct construction operations so that operation of existing facilities near or adjacent to the work, including electric, telephone, sewer, water, gas or drainage utilities, are sustained insofar as the requirements of the project will permit.

B. Protect existing facilities from damage or movement through installation of adequate

support systems and use of proper equipment, including application of careful excavation and backfilling techniques in sensitive areas.

C. Existing utilities and other facilities which are damaged by the Proposer's construction operations shall be promptly repaired by Proposer to the satisfaction of the affected owner. Such repair work shall be done at Proposer's expense.

D. When aboveground visible facilities such as poles, wires, cables, fences, signs or structures constitute an unavoidable interference, notify and consult with Rockland Green and Engineer regarding temporary removal and later restoration of the interfering item. Arrange with Owner to remove and later restore the interfering item to the satisfaction of the Owner, subject to approval of the project Owner; or, allow affected owner to perform such work with his own forces. Under either arrangement, such work shall be done at Proposer's expense.

E. Take all necessary precautions to prevent fires at or adjacent to the work, buildings, and other facilities. No burning of trash or debris is permitted. If permanent fire extinguishers are used, they shall be recharged and in "new" condition when turned over to Rockland Green.

3.05. ABANDONMENT OF UTILITIES

A. Remove existing utilities to be abandoned within limits of excavation or impinging on excavation limits.

3.06. RESTORATION OF PROPERTY MARKERS

A. Property corner markers, boundary monuments, etc., disturbed or moved by the Proposer's operation shall be restored, in conformance with the property deed description, by a licensed land surveyor. Restoration of the property corner markers or boundary monuments shall be certified by said surveyor on a map prepared by him which shows the work accomplished. One copy of the map shall be given to the property owner and one copy given to the project Owner. This work shall be completed at the expense of the Proposer.

END OF SECTION

SECTION 02222

EXCAVATING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

A. Excavation for underground electrical work.

B. Excavation for concrete pad for generator

1.02. RELATED SECTIONS

Agreement – Contract for Installation of a New Standby Generator, Including Electrical Service Modifications at the West Nyack Transfer Station

A. Division 1 specifications

B. Section 02205 - PROTECTION OF EXISTING FACILITIES

C. Section 02223 - BACKFILLING

D. Section 02228 - COMPACTION

1.03. FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01. PREPARATION

A. Identify required lines, levels, contours, and datum. Review subsurface report and other available site information prior to excavation.

B. Identify and notify Rockland Green of any known underground, above ground, and aerial utilities. Stake and flag locations.

C. Notify Rockland Green and utility companies.

D. Protect above- and below-grade utilities which are to remain.

E. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.

F. Protect benchmarks, existing structures, fences, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.

G. Excavations shall be in complete accordance with all details of applicable codes, rules, and regulations including all local, state, and federal regulations including the Occupational Safety and Health Administration (OSHA) Title 29 Code of Federal Regulations Part 1926, Subpart P - Excavations and Trenching Standards.

3.02. CLASSIFICATION OF EXCAVATED MATERIAL

A. Classifications of excavated materials are as follows:

1. Unclassified Excavation - “Unclassified excavation” shall include all material excavated within the authorized lines and grades prescribed in the Drawings. Unclassified excavation shall include “rock excavation” as well as “common excavation” as defined herein.

2. Common Excavation - “Common excavation” shall include all excavation except “rock excavation.” All unconsolidated and non-indurated material, rippable rock, loose rock, soft mineral matter, weathered rock or saprolite, and soft or friable shale which is removable with normal earth excavation equipment shall be considered “common excavation.” All boulders and detached pieces of solid rock or concrete or masonry less than 1 cubic yard in volume shall be classified as “common excavation.”

3. Rock Excavation - “Rock excavation” shall include all sound solid masses, layers and ledges of consolidated and indurated rock or mineral matter of such hardness, durability and/or texture that it is not rippable or cannot be excavated with normal earth excavation equipment. Should a conflict arise as to the classification of excavation as either “common” or “rock,” the following test shall be used in the appropriate determination:

a. Where practicable, a late model tractor mounted hydraulic ripper equipped with a one digging point of standard manufacturer’s design adequately sized for use with and propelled by a crawler-type tractor rated between 210 and 240 net fly-wheel horsepower, operating in low gear, shall be utilized. Should the suspect material not be effectively loosened or broken down by ripping in a single pass with the ripper, the material shall be classified as “rock.”

b. In situations where interbedded strata of “common excavation” material and “rock excavation” material are encountered in the same excavation; the individual classification of those materials shall be made on an average percentage basis of the occurrence of those materials as measured in stratigraphic sections and as approved by the Engineer.

c. When rock is encountered in excavations, it shall be removed by jackhammering or any other method suitable and safe considering the proximity of existing utilities or facilities.

d. Blasting operations are not acceptable for any portion of this contract.

3.03. EXCAVATING

A. Protect adjacent structures which may be damaged by excavation work, including utilities

and pipe chases.

B. Excavate subsoil required to accommodate concrete slabs-on-grade and new underground utilities.

C. Machine-slope banks to angle which is safe for specific material in which excavation is made and complies with current OSHA standards.

D. Excavation cut not to interfere with normal 45-degree bearing splay of any existing foundations. Undercutting of excavation faces will not be permitted.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation.

F. Hand trim excavation to required undisturbed subgrade. Remove loose matter.

G. Remove lumped subsoil, boulders, and rock under 1 cubic yard, measured by volume. Refill voids with compacted gravel/crushed stone.

H. Notify Engineer of unexpected subsurface conditions, or of questionable soils encountered at required subgrade elevations, and discontinue work in area until notified to resume operations.

I. Should the Proposer, through negligence or otherwise carry his excavation below the designated subgrade, Mix ”C” concrete or such other materials as may be approved by the Engineer, shall be furnished, and placed as backfill in sufficient quantities to reestablish the designated subgrade surface. Granular material used for backfilling shall be spread and compacted in conformance with the requirements of Sections 02223, Backfilling, and 02228, Compaction. The cost of this refilling operation, including any tests associated therewith, shall be borne by Proposer.

J. Stockpile excavated material (if applicable) in area designated on-site and remove excess material not being reused, from site.

3.04. DISPOSAL OF MATERIAL

A. All excavated material except reusable topsoil or reusable fill shall be classified as surplus material and disposed of off-site at the Proposers expense unless Rockland Green designates an on-site location.
   1. All concrete and asphalt demolition debris (not gravel) shall be removed and loaded into trucks for disposal and recycling at the Rockland Greens West Nyack (Clarkstown) transfer station, Route 303, West Nyack, NY. Concrete demolition debris must be reduced in size to a maximum size of 24 inches (length) x 24 inches (width) x 8 inches (thickness) prior to loading and transport to the West Nyack transfer Station. Coordinate with Rockland Green for delivery and disposal methods.

B. All surplus material shall be disposed of at a facility approved by Rockland Green. Re-use of excavated material shall conform with Section 02223, backfilling and requires prior approval by the Rockland Green.

C. Make all arrangements for disposal sites unless Rockland Green designates special locations. All expenses for disposal shall be borne by the Proposer.

D. Prior to depositing surplus material at any off-site location, obtain a written agreement

between Proposer and the owner of the property on which the disposal of the material is proposed. The agreement shall state that the owner of the property gives permission for the Proposer to enter and deposit material of a particular classification on the owner's property at no expense to Rockland Green, and shall include any other conditions pertinent to the situation as agreed upon by each party. The owner of the property is responsible for all risks associated with the surplus material. Rockland Green is not liable for damages associated with the surplus material. The agreement shall be reviewed with and approved by Rockland Green prior to depositing surplus material at any off-site location.

3.05. FIELD QUALITY CONTROL

A. Field inspection will be performed under provisions of Section 01400, Quality Control.

B. Provide for visual inspection of bearing surfaces or any surfaces that require documentation of the prepared surface.

3.06. PROTECTION

A. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation and according to current OSHA regulations and standards.

B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

C. Exposed subgrade surfaces shall remain undisturbed, drained, and maintained as uniform, plane areas, shaped to receive the foundation components of the building or structure.

END OF SECTION

SECTION 02223

BACKFILLING

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

A. Site filling and backfilling for underground utility installations.

B. Fill under concrete slabs-on-grade

C. Classification of materials.

D. Consolidation and compaction.

1.02. RELATED SECTIONS

A. Section 01500 - TEMPORARY CONTROLS

B. Section 02222 - EXCAVATING

C. Section 02228 - COMPACTION

1.03. REFERENCES

A. ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates

B. ASTM D1556 - Density of Soil in Place by Sand-Cone Method

C. ASTM D1557 - Laboratory Compaction of Soil Using Modified Effort

D. ASTM D2922 - Density of Soil in Place by Nuclear Methods

E. ASTM D3017 - Water Content of Soil in Place by Nuclear Methods

1.04. SUBMITTALS

A. Granular Materials

1. Granular materials required for filling, backfilling, subbase, and other purposes shall be as shown on the Drawings. Prior to bidding, prospective Proposers shall familiarize themselves with the available quantities of approved on-site and off-site materials.

2. For each on-site or off-site material proposed, notify the Engineer of the source of the material, and furnish to the Engineer for acceptance a certified gradation analysis (ASTM C136) and a Modified Proctor Compaction Test (ASTM D1557) at least 10 days prior to date of anticipated use of such material and that has been tested within the last 6 months.

3. The Engineer and Rockland Green reserves the right to inspect proposed source of

off-site granular material and to order such tests of the materials as he deems necessaryto ascertain its quality and graduation of particle size. The Proposer shall, at his own expense, engage an approved testing laboratory to perform such test, and submit certified test results to the Engineer. If similar tests of the material from a particular source were performed previously (within 6 months), submit results of these tests to the Engineer for consideration.

4. No granular materials shall be used on this project for fill, backfill, subbase, or other purpose until approval is obtained from the Engineer, and only material from approved sources shall be used.

B. Geotextile Fabrics

1. submit technical data from the proposed manufacturer regarding the specific product being submitted on, including a 3-inch representative sample of each geotextile product being proposed.

2. Submit manufacturers specifications of average roll characteristics for standards ASTM geotextile tests for each geotextile to be used.

PART 2 PRODUCTS

2.01. ON-SITE MATERIALS

A. Type A, Excavated Material - Material under this classification shall be derived solely from excavations necessary to construct the project to the lines and grades specified. If the excavated material on-site is approved for reuse and is suitable, it shall be used for filling or backfilling purposes in non-structural areas. The Proposer may, at his own expense, substitute other types of material in place of Type A material, provided such substitution is approved in advance by the Engineer. All replaced or surplus material shall be disposed of as directed by the Engineer and Rockland Green.

2.02. OFF-SITE MATERIALS

A. No gravel, sand, crushed stone, or run-of-crusher material shall be used for this project until acceptance is obtained from the Engineer, and only material from approved sources shall be used. A certified sieve analysis from the supplier shall be submitted for the Engineer's acceptance prior to the use of any materials specified in Article 2.02.

B. Type B – Sand and Gravel

1. Shall be a mixture of hard, durable gravel and sand.

2. Shall be free from organic matter, trash, shale, debris, snow ice and other frozenor mechanically deleterious material.

3. Lightweight Sand Fill

a. Maximum Dry Density of Lightweight Sand Fill, as determined by ASTM D698 (Standard Proctor) shall not exceed 110 pcf, and the material gradation shall conform to the following:

Sieve Size	Percent Passing by Weight
1/4 inch	100
#40	0-50
No. 200	0-10

PART 3 EXECUTION

3.01. EXAMINATION

A. Verify fill materials to be used are acceptable.

B. Verify that all subsurface installations for the project have been inspected and are ready for backfilling.

3.02. PREPARATION

A. Generally, compact subgrade to density requirements for subsequent backfill materials.

B. Cut out soft areas of subgrade not capable of in situ compaction. Compact to density equal to or greater than requirements for subsequent backfill material.

C. Inspect spaces to be backfilled and remove all unsuitable materials including sheeting, bracing, forms and debris prior to commencing backfilling operations.

3.03. BACKFILLING

A. Backfill areas to required contours, grades, and elevations with unfrozen materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Backfill material shall be inspected prior to placement and all roots, vegetation, organic matter, or other foreign debris shall be removed. Stones larger than 12 inches in any dimension shall be removed or broken. Stones shall not be allowed to form clusters with voids.

D. Backfill material shall not be placed when moisture content is more than two percent above optimum or is otherwise too high to allow proper compaction. When material is too dry for adequate compaction, water shall be added to the extent necessary.

E. Hydraulic compaction by ponding or jetting will not be permitted except in very unusual conditions and then only upon written request and demonstration of its effectiveness by the Proposer and the written acceptance by the Engineer.

F. Place and compact fill materials in continuous layers to meet appropriate requirements of Table 1 of Section 02228, Compaction.

G. Employ a placement and compaction method consistent with Section 02228, Compaction,

that does not disturb or damage adjacent walls, drainage systems, waterproofing, protective coverings, utilities in trenches, underground conduits or tanks.

H. Maintain optimum moisture content of backfill materials to attain required compaction density.

I. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.

J. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.

K. Slope grade away from building minimum 2 inches in 10 feet unless noted otherwise.

L. Rough grade all backfilled and filled areas to meet subsequent topsoiling or paving requirements. Make grade changes gradual. Blend slopes into level areas.

M. Remove surplus backfill materials from site.

N. Leave fill material stockpile areas completely free of excess fill materials.

3.04. TOLERANCES

A. Top Surface of Backfilling Under Pavement Subgrade - ±1 inch from required elevations.

B. Top Surface of Backfilling Under Paved Areas- ±1/2 inch from required elevations.

C. Top Surface of General Backfilling - ±1 inch from required elevations.

3.05. FIELD QUALITY CONTROL

A. Tests and analysis of fill material will be performed in accordance with ASTM D698 and with Section 02228, Compaction. Compaction testing will be performed in accordance with ASTM D698.

B. If tests indicate work does not meet specified requirements, remove work, replace, and retest at no cost to Rockland Green.

3.06. PROTECTION OF FINISHED WORK

A. Protect finished work under provisions of Section 01500, Temporary Facilities.

B. Regrade and re-compact fills subjected to vehicular traffic.

END OF SECTION

SECTION 02228

COMPACTION

PART 1 GENERAL

1.01. DESCRIPTION OF WORK

A. Compaction requirements and test methods.

B. Compact all subgrades, foundations, embankments, trench backfills, filled and backfilled material as specified.

1.02. RELATED SECTIONS

A. Section 01400 - QUALITY CONTROL: Inspection and testing by laboratory services.

B. Section 02223 - BACKFILLING

1.03. REFERENCES

A. ASTM D698 - Laboratory Compaction of Soil Using Standard Effort

B. ASTM D1556 - Density of Soil in Place by the Sand-Cone Method

C. ASTM D1557 - Laboratory Compaction of Soil Using Modified Effort

D. ASTM D2922 - Density of Soil in Place by Nuclear Methods

E. ASTM D3017 - Water Content of Soil in Place by Nuclear Methods

1.04. SUBMITTAL

A. Submit in writing a description of the equipment and methods proposed to be used for compaction.

1.05. QUALITY ASSURANCE

A. The Proposer shall adopt compaction methods which will produce the degree of compaction specified herein, prevent subsequent settlement, and provide adequate support for the surface treatment, pavement, structure and piping to be placed thereon, or therein, without damage to the new or existing facilities.

B. The natural subgrade for all footing, mats, slabs-on-grade for structures or pipes shall consist of firm undisturbed natural soil, at the grades shown on the Drawings.

C. After excavation to subgrade is completed, the subgrade shall be compacted if it consists of loose granular soil or if its surface is disturbed by the teeth of excavating equipment.

1. This compaction shall be limited to that required to compact loose surface material and shall be terminated if it causes disturbance to underlying fine-grained soils, as revealed by weaving or deflection of the subgrade under the compaction equipment.

2. If the subgrade soils consist of saturated fine or silty sands, silts, or clay or varved clays, no compaction shall be applied.

PART 2 PRODUCTS

2.01. MATERIALS

A. Materials to be compacted shall be as specified in Section 02223, Backfilling.

PART 3 EXECUTION

3.01. EXAMINATION

A. Examine spaces to be filled beforehand and remove all unsuitable materials and debris including sheeting, forms, trash, stumps, plant life, etc.

B. Inspect backfill and fill materials beforehand and remove all roots, vegetation, organic matter, or other foreign debris. Stones larger than 12 inches in any dimension shall also be removed or broken into smaller pieces.

C. No backfill or fill material shall be placed on frozen ground nor shall the material itself be frozen or contain frozen soil fragments.

D. Spaces to be filled shall be free from standing water so that placement and compaction of the fill materials can be accomplished in “dry” conditions.

3.02. PREPARATION

A. Brace walls and slabs of structures to support surcharge loads and construction loads imposed by compaction operations.

B. Proof-roll all subgrade surfaces to accept fill material. Proof rolling shall be conducted using equipment accepted by the engineer prior to proof rolling.

C. Each layer of fill shall be compacted to the specified density the same day it is placed.

1. The moisture content of backfill or fill material shall be adjusted, if necessary to achieve the required degree of compaction.

D. Compact each lift in accordance with Table 1.

E. Match compaction equipment and methods to the material and location being compacted to obtain specified compaction, with consideration of the following guidelines:

1. Rubber-tired rollers are preferred for most areas to prevent bridging of softer

materials.

2. Double smooth drum rollers may be used provided that careful inspection can prevent bridging.

3. Compaction roller should be lighter in weight than proof-rolling equipment, with a minimum compaction force of 350 lbs. per linear inch (PLI).

4. Vibratory compaction is preferred for dry, granular materials.

5. Hand compaction equipment such as impact rammers, plate, or small drum vibrators, or pneumatic buttonhead compactors should be used in confined areas.

6. Hydraulic compaction by ponding or jetting will not be permitted except in unusual conditions, and then only upon written approval by the Engineer and after a demonstration of effectiveness.

7. Backhoe-mounted hydraulic or vibratory tampers are preferred for compaction of backfill in trenches under pavements over 4 feet in depth. The upper 4 feet shall be compacted as detailed above or with hand-guided or self-propelled vibratory compactors or static roller.

8. For plastic pipelines (HDPE, PVC, PE, or PB), do not compact directly over center of pipe until backfill has reached 2 feet above top of pipe.

TABLE 1

COMPACTION REQUIREMENTS

Construction Element	Maximum Compaction Layer Thickness (inches)	ASTM	Minimum Compaction
I. STRUCTURES*			
a. Fill beneath slabs-on- grade - hand-guided compaction	8	D698	93-95%

3.03. FIELD QUALITY CONTROL

A. Material Testing

1. The Engineer reserves the right to order testing of materials at any time during the work to confirm conformance with specifications. The Proposer shall provide testing at no additional cost to Rockland Green.

2. Routine compaction testing will be done by Rockland Green using a qualified, independent testing laboratory.

3. The Proposer shall aid the Engineer in obtaining representative material samples to be used in testing.

4. For each material which does not meet specifications, the Proposer shall reimburse Rockland Green for the cost of the test and shall supply an equal quantity of acceptable material, at no additional compensation.

5. The Proposer shall anticipate these tests and incorporate the time and effort into procedure.

B. Compaction Testing

1. The Engineer reserves the right to order the qualified independent testing laboratory to conduct in-place density tests of compacted lifts to confirm compliance with the specifications, at the Proposers expense.

2. Testing shall be conducted for every 200 cubic yards of fill or backfill, or every 100 linear feet of trench backfill placed. Tests are required for each lift of fill or backfill placed.

3. The Proposer shall dig test holes and provide access to all backfill areas at no additional compensation when requested by the Engineer.

4. For each test which does not meet specifications, the Proposer shall retest at his cost. If the retest does not meet specifications, the Proposer shall replace and recompact material to the specifications at no additional cost to the Rockland Green.

5. The Proposer shall anticipate these tests and incorporate the time and effort into procedures.

6. Nuclear moisture density testing by “probe” methods will be acceptable for compacted layers not exceeding 12 inches in thickness.

   a. Nuclear “backscatter” methods will be acceptable only for testing asphalt paving layers not more than 3 inches in thickness.

   b. Only certified personnel will conduct nuclear testing.

   c. If the nuclear method is utilized, the results shall be checked by at least one in-place density test method described above.

C. Unacceptable Stockpiled Material - Stockpiled material may be tested according to material testing materials.

D. Alternate Methods of Compaction - The Proposer may employ alternate methods of compaction if the desired degree of compaction can be successfully demonstrated to the Engineer’s satisfaction.

E. Select Material - On-Site

1. Any on-site material may be used for select fill material provided it meets all the requirements of the equivalent off-site material.

2. No on-site material shall be used without prior approval of the Engineer.

F. Systematic Compaction - Compaction shall be done systematically, and no consideration shall be given to incidental coverage due to construction vehicle traffic.

3.04. PROTECTION

A. Prior to terminating work for the day, the final layer of compacted fill, after compaction, shall be rolled with a smooth-wheel roller if necessary to eliminate ridges of soil left by tractors or equipment used for compaction or installing the material.

B. As backfill progresses, the surface shall be graded to drain off during incidence of rain such that no ponding of water shall occur on the surface of the fill.

C. The Proposer shall not place a layer of fill on snow, ice or soil that was permitted to freeze prior to compaction.

1. These unsatisfactory materials shall be removed prior to fill placement.

END OF SECTION

SECTION 02980

SITE REHABILITATION

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Site restoration resulting from excavation and backfilling work outside of pavement limits.

B. Removal and disposal of all excess materials, equipment, trash, and debris used for, or resulting from, the work included in this section.

1.02. RELATED SECTIONS

Agreement – Contract for Installation of a New Standby Generator, Including Electrical Service Modifications at the West Nyack Transfer Station

A. Division 1 specifications.

B. Division 2 specifications.

1.03. REFERENCES

A. The American Association of Nurserymen Standards - ANSI Standard 2-60.1, “Nursery Stock”.

B. Soil Conservation District of the Department of Agriculture.

1.04. QUALITY ASSURANCE

A. Areas and Features to be Restored

1. All areas, including natural features occurring thereon, which are damaged or disturbed by the Proposer’s operations, shall be restored, repaired, or replaced to the same or superior condition which existed prior to construction or as modified herein or as shown on the Drawings.

2. Artificial features shall be restored equal to a new condition or as modified herein or as shown on the Drawings.

1.05. SUBMITTALS

A. Submit under provisions of Section 01300, Submittals.

1.06. QUALIFICATIONS

A. All planting material to be furnished from a nursery which meets the requirements of the American Association of Nurserymen.

1.07. PACKING AND SHIPPING

A. All seed furnished for this project shall be delivered in standard size unopened bags of the

vendor, showing weight, mixture, vendor's name, and guaranteed analysis.

1.08. STORAGE

A. Seed shall be properly stored in dry conditions at the site of the work.

1. Any seed damaged or spoiled during storage shall be replaced by the Proposer.

1.09. ENVIRONMENTAL CONDITIONS

A. Topsoil shall not be delivered or placed in a frozen or muddy condition.

B. Seeding is to be done on dry or moderately dry soil.

1. Seeding is to be done when the wind velocity does not exceed 5 miles per hour.

1.10. SCHEDULE

A. The Proposer is advised to do all seeding during the periods of May 1st to June 15th, or August 15th to October 1st.

1. Seeding may be conducted under unseasonable conditions without additional compensation, and at the option and full responsibility of the Proposer.

1.11. GUARANTEE

A. Any new, reestablished, replaced, or disturbed plant material that fails to respond properly within the one-year guarantee period shall be replaced as specified above at the Proposer's expense.

PART 2 PRODUCTS

2.01. MATERIAL

A. Topsoil

1. Topsoil shall be natural, fertile, friable agricultural soil capable of sustaining healthy vegetative growth.

2. Topsoil shall meet the following gradation requirements free of stones, roots, sticks and other foreign substances:

Grain Diameter	Sieve Size	Percent Passing by Weight
6.3 mm	6.3 mm	100
4.75 mm	No. 4	60-85
0.075 mm	No. 200	20-45
0.002 mm	--	7-27

a. Topsoil shall contain less than 52 percent sand.

3. The pH of topsoil shall be between 5.0 and 7.0.

4. Topsoil shall contain no less than 6.0 percent organic matter.

5. Topsoil may be from previously excavated, stockpiled, and protected materials, provided the materials meet the requirements for topsoil.

B. Fertilizer

1. General Fertilizer

a. Fertilizer shall be a complete, partially organic, commercial 10-6-4 fertilizer.

b. All fertilizer shall contain a minimum of 10 percent nitrogen, 6 percent available phosphorous and 4 percent potash.

c. Other commercially available fertilizers, such as 20-10-10 and 12-6-6, may be utilized provided that spreading rates are adjusted to provide the aforementioned minimum requirements for nitrogen.

2. Plant Fertilizer - As recommended by local Soil Conservation District of the Department of Agriculture for the type(s) of soil(s) and plant(s).

C. Seed

1. All seed shall be fresh, re-cleaned and of the latest crop year.

2. Each component shall meet or exceed the minimum State and Federal requirements for purity and germination for that component.

3. The weed content of each component shall not exceed 0.1 percent.

4. The following seed mixture is suggested for lawns or cultivated (landscape) areas:

Percent by Weight	Variety	Purity	Germination
50	Kentucky Blue Grass	85%	80%
20	Red or Chewing Fescue	97%	80%
30	Red Top	92%	90%

a. Variations may be recommended by qualified personnel but shall not be used without approval by the Engineer.

D. Mulch for Tree or Shrub Plantings - Mulch shall consist of dry, clean, hardwood chips.

E. Mulch for Seeded Areas - Mulch shall be oat, wheat or rye straw, or hay, free from noxious weeds and other materials which may interfere with the establishment of a healthy stand of grass.

F. Plantings - Trees, shrubs, vines, ground cover and other vegetation to be replaced or installed new as specified which meet the requirements of the American Association of Nurserymen.

1. Classifications of plants, dimensions, planting procedures, etc., shall conform to ANSI Standard Z 60.1, “Nursery Stock”.

G. Peat Moss - As recommended by the supplier of nursery stock.

H. Metal Edging

1. Edging shall be 3/16-inch thick by 4-inches high steel in 16- and 20-foot lengths.

a. Secure edging with 16-inch long tapered steel stakes at 30 inches on center.

b. All steel materials shall be painted with one coat of epoxy primer and two coats of epoxy finish.

I. Weed Barrier - Weed barriers shall consist of two plies of 6-mil thick black polyethylene film.

J. Stones

1. All stones used for landscape surfacing shall be between 2 and 4 inches in maximum dimension and average to about 3 inches.

a. Stones shall be well-rounded.

2. All stones used for mowing strips shall be a washed crushed stone, size 1/2-inch to 1-inch size.

K. Tree Wrapping - Wrapping for trees shall be 8 ounce first quality burlap.

PART 3 EXECUTION

3.01. EXAMINATION

A. Determine that surface area is ready for fine grading and/or to receive topsoil and seeding or plantings.

1. Remove trash, debris, large stones, and other foreign materials from surface areas to be restored or rehabilitated.

2. Topsoil shall be free of frozen fragments, debris, large stones, and other foreign materials.

3.02. PREPARATION

A. Fine Grading - Areas requiring topsoil shall be fine graded to within 4 inches of finished grade to provide a minimum compacted thickness of 4 inches of topsoil at all locations.

1. All such areas, whether in cut or fill, shall be raked to a depth of 1 inch, be parallel to finished grade as shown or required and shall be free of all stones, larger than 1 inch, roots, rubbish, and other deleterious material.

3.03. INSTALLATION

A. Areas to be Developed

1. When the project site is to be modified and developed to meet new conditions, the Proposer shall perform all required grading, topsoiling, fertilizing, seeding, planting, mulching and maintenance of areas, all in accordance with the Drawings and as specified herein.

2. Unless shown otherwise on the Drawings, the entire unpaved area within the grading limits and within the overall areas excavated and backfilled shall be so developed.

3. New landscaping work and artificial features, if any, are shown on the Drawings and specified elsewhere.

B. The Proposer shall reestablish all existing cultivated or landscape items, trees, shrubs, vines, and ground covers as practicable.

1. Proposer shall provide additional or modify existing vegetation, as shown on the Drawings.

2. Existing trees, plants, shrubs, saplings, ground cover, vines, etc., which are disturbed or damaged by the Proposer’s operations shall be replaced with new plant materials.

3.04. TOPSOILING

A. Topsoil shall be furnished and spread in the required areas to a depth of approximately 4 inches.

1. Stockpiled topsoil may be used if approved by the Engineer.

2. In the event this topsoil is not satisfactory, or is inadequate to cover the required areas, the Proposer shall furnish the required amount of satisfactory topsoil from approved sources off the site.

B. The soil shall be uniformly compacted with a light hand roller to a final depth of not less than 2 inches.

1. When finished, the surface shall conform to the finished grades shown or required and shall have a smooth pulverized surface at the time of seeding.

2. Any irregularities shall be corrected before the fertilizer and seed are placed.

3. Any subsequent settlement or displacement of the topsoil shall be restored to an acceptable condition at the Proposer’s expense.

3.05. FERTILIZING

A. The fertilizer shall be uniformly spread by a mechanical spreader at the rate of 25 lbs. per 1,000 square feet.

1. The fertilizer shall be incorporated into the upper 2 inches of topsoil immediately after spreading.

2. Other commercial fertilizers, such as 20-10-10 or 12 6-6 may be used at rates adjusted to provide the same quantity of nitrogen per 1,000 square feet.

3.06. SEEDING

A. Seed shall be applied at a rate of not less than 5 lbs. per 1,000 square feet, using a mechanical spreader.

1. Upon completion of the seeding, the area shall be raked lightly and rolled with a light hand roller.

B. The process of spraying grass seeds, water, fertilizer, and mulch known as hydro-seeding or hydro-mulching may be utilized if water hazards are minimized.

1. Presoaking, the spraying of the materials and watering after spraying shall be in strict accordance with the manufacturer's instructions.

2. All materials, protection, maintenance, etc., shall be in conformance with this specification.

3. The mulch may be a wood fiber material compatible with the spray equipment.

3.07. PLANTING

A. All new plant materials which are to replace existing plant materials shall be of the same genus and species as the original and shall be placed in the same location as the item being replaced.

1. The size of the new plant materials shall, if practical, match that of the item being replaced, consistent with normally available sizes from nursery stock.

2. Depending on the size and type of material, and when ordered by the Engineer, guy wires, stakes, anchors, and wrappings shall be furnished and installed in a proper manner to brace and protect the plant.

3. The Proposer shall, as soon as practicable, water and maintain all reestablished, replaced, or disturbed plant materials until final acceptance of the contract.

B. Plant shall be set plumb and true.

1. Shape area around saucer to form drainage grades as shown on the Drawings.

C. Install wooden posts, guy wires and hose section for protection as shown on the Drawings.

1. Provide three guy wires per planted item.

D. For all trees of 2-inch caliber or larger, wrap with tree wrap.

1. Begin at base of tree and work upward to the first branches.

2. Tie the burlap wrap with cord (no synthetic cord nor wire) at 2-foot intervals and at the bottom and top.

E. Place weed barriers on prepared subgrade at depth shown on the Drawings.

1. Turn up weed barrier at all edges and corners.

F. Place washed stone over weed barriers to the specified depths.

1. Rake stone to produce a smooth, uniform surface.

G. Install metal edging such that the top edge projects 1/4 inch above surrounding soil and stone.

3.08. MULCHING AND PROTECTION

A. The Proposer shall protect and maintain seeded areas to assure a full even stand of grass.

1. Immediately after seeding and rolling, the Proposer shall apply oat, wheat or rye straw, or hay, free from noxious weeds, as a mulch, to a loose depth of about 1 inch.

2. The Proposer shall perform all watering and reseeding as necessary for a minimum of 30 days and until final acceptance of the Contract, to ensure the establishment of a uniform stand of specified grasses.

3.09. MAINTENANCE

A. Any portion of seeded areas failing to produce a full uniform stand of grass from any cause, shall be reseeded at full rate and re-fertilized at one-half rate and protected and maintained until such a full stand has been obtained.

B. Plantings to be maintained for one year following final acceptance of the contract.

3.10. SPECIAL CONDITIONS

A. Damaged Trees - Vegetation which has been damaged by site preparation activities and deemed non-functional by the Rockland Green or engineer, shall be replaced by the Proposer with vegetation of the same caliper, genus, and species at no additional compensation to the Proposer.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Reinforcing bars.

B. Bar supports and bolsters.

1.02. RELATED SECTIONS

Agreement – Contract for Installation of a New Standby Generator, Including Electrical Service Modifications at the West Nyack Transfer Station

A. Section 03300 - CAST-IN-PLACE CONCRETE
B. Section 03370 – CONCRETE CURING AND PROTECTION

1.03. REFERENCES

The publications listed below form a part of these specifications.

A. American Concrete Institute

1. ACI 301 - Specifications for Structural Concrete

2. ACI 315 - Details and Detailing of Concrete Reinforcement

3. ACI 315R - Manual of Engineering and Placing Drawings for Reinforced Concrete Structures

4. ACI 318 - Building Code Requirements for Structural Concrete

5. ACI 350 - Code Requirements for Environmental Engineering Concrete Structures

6. ACI 530 - Building Code Requirements for Masonry Structures

B. American Society for Testing and Materials

1. ASTM A185 - Steel Welded Wire Reinforcement, Plain, for Concrete

2. ASTM A497 - Steel Welded Wire Reinforcement, Deformed, for Concrete

3. ASTM A615 - Deformed and Carbon-Steel Bars for Concrete Reinforcement

4. ASTM A767 - Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

5. ASTM A780 - Standard Practice for Repair of Damaged Hot-Dip Galvanized Coatings

6. ASTM A970 - Specification for Welded or Forged Headed Bars for Concrete

Reinforcement

7. ASTM C1116 - Specification for Fiber-Reinforced Concrete and Shotcrete

8. ASTM E329 - Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

C. Concrete Reinforcing Steel Institute (CRSI) - Placing Reinforcing Bars

D. American Welding Society (AWS) - AWS D12.1, Reinforcing Steel Welding Code for Reinforcing Steel.

1.04. SUBMITTALS

A. Reinforcement Shop Drawing - Submit shop drawings in accordance with ACI 301, ACI 315, ACI 315R, and as modified below.

1. Shop drawings shall be clear enough so that every reinforcing bar in the structure can be located and shall be complete with all dimensions of the structure without the need to refer to the Contract Drawings.

2. A reinforcing bar layout plan shall be provided for each slab or walkway level, and an elevation view reinforcing bar layout shall be provided for each wall.

3. Shop drawings shall clearly indicate all construction joints, expansion joints, and control joints. Proposer shall coordinate with the reinforcement detailer so that all reinforcement interruptions and/or all splices can be shown and accounted for in the detailing.

4. Reinforcement shall be shown as bent where needed to clear waterstop and/or maintain uniform cover. Bars with bends shall be indicated schematically on the plan and elevation views.

5. All openings and pipe penetrations in walls and slabs shall be indicated on the reinforcement shop drawings (coordinated by Proposer). Formed openings larger than 1.25 times the rebar spacing in any direction shall be detailed with additional reinforcement around the opening in accordance with the Standard Detail on the Contract Drawings.

6. Photocopies of Contract Drawings, in whole or in part, will not be acceptable.

7. All re-submittals of shop drawings shall have all revisions/corrections clearly highlighted to the Engineer (e.g., labeled, clouded, etc.)

8. Final corrected copies of shop drawings (for file and to be used in the field) shall be submitted a minimum of 14 days prior to start of installation.

9. No reinforcing bar fabrication shall commence until shop drawings are approved.

10. All reinforcing bars shall be shop fabricated. No reinforcing bars shall be field bent.

B. Mill test reports showing physical and chemical analysis shall be provided for Engineer's records.

C. Submit catalog cut for threaded rebar splicing system.

D. Submit catalog cut for mechanical rebar splicing system.

E. Submit catalog cuts, clearly marked to indicate reinforcing bar supports and bolsters to be used for walls and slabs.

1.05. COORDINATION

A. All construction joints, expansion joints, and control joints must be coordinated by the Proposer so that all reinforcement interruptions and/or splices can be shown.

B. Proposer shall locate all wall/slab openings and pipe penetrations on the shop drawings prior to Engineer's review and approval.

C. Required adjustments to reinforcing bars to accommodate cast-in (embedded) items shall be shown and detailed on the shop drawings.

D. Proposer shall coordinate the supply of all bar supports and bolsters.

1.06. QUALITY ASSURANCE

A. Reinforcement work shall conform to the applicable requirements of ACI 301, ACI 315, ACI 318, and CRSI referenced publications.

B. All reinforcing bars shall have the manufacturer's mill marking rolled into the bar which shall indicate the producer, size, type, and grade.

C. All reinforcing bars shall be neatly bundled and tagged for placement when delivered to the job site. Bundles shall be properly identified for coordination with mill test reports.

1.07. DELIVERY, STORAGE, AND HANDLING

A. Deliver reinforcing bars and accessory materials to the site in an undamaged condition.

B. Reinforcement shall not be stored in direct contact with earth and shall be kept free of mud.

C. Bundles of bars may be loaded in or on structures, providing the Proposer avoids premature loading or overloading of the structure. Surface protection from rust stains or damage shall be provided by the Proposer.

D. Equipment for handling galvanized reinforcing bars shall have protected contact areas. Bundles of coated bars shall be lifted at multiple pick-up points to minimize bar-to-bar abrasion from sags in the bundles. Coated bars shall be stored on protective cribbing.

PART 2 PRODUCTS

2.01. MATERIALS

A. Deformed Reinforcing Bars - ASTM A615, Grade 60.

B. Bar Supports and Bolsters

1. Bar supports and bolsters shall be a non-bleeding and non-staining material where concrete surfaces remain exposed. Plastic, plastic tipped, or stainless steel bar supports shall be used for uncoated reinforcing bars. Galvanized reinforcing bars shall utilize bar supports and bolsters that are galvanized, coated with epoxy or another polymer, or made of plastic.

2. Bar supports bearing on grade, insulation, or soft material shall be continuous runner type supplied with continuous welded on plates. Individual high chair support will not be considered adequate.

Alternatively, minimum 4,000 psi precast concrete blocks specifically cast for proper support of reinforcing bars can be utilized. The use of pavers, brick, or concrete masonry units (CMU) to support reinforcement shall not be permitted.

2.02. SOURCE QUALITY CONTROL

A. Shop Inspection - The Engineer reserves the right to inspect the manufacturer's facilities while fabrication of reinforcing bars for this project is being performed.

PART 3 EXECUTION

3.01. ERECTION INSTALLATION APPLICATION

A. Placement of reinforcement shall be in accordance with ACI and CRSI referenced publications.

B. Reinforcing bars shall be spaced as shown on the approved shop drawings. Deviations with bars spaced up to 1.25 times the required spacing, necessary because of interference with inserts, conduits, piping, small openings for ducts, etc., are allowable as long as four consecutive bars average out to the required spacing.

C. Where larger openings are encountered and reinforcing bars must be cut, equivalent splice bars (rounded bars) must be placed at each side of the opening plus #5 diagonal bars enveloping the opening at each corner (reference Standard Detail on Contract Drawings).

D. Reinforcing bars shall be accurately located in forms and held in place before and during concreting by using supports of adequate strength and black annealed tie wire (#16 gage or heavier), to prevent bar displacement.

E. Tie wires shall be bent into the wall or slab so as to not intrude into the reinforcement concrete cover space.

F. Install bar supports and bolsters as specified in Part 2. Pavers, brick, or CMU supports shall not be permitted. Additional bar support shall be installed to eliminate deflection of reinforcement.

G. The minimum distance between non-lap spliced, parallel bars shall be two times the bar diameter, but in no case shall be less than 1 1/2 inches.

3.02. COVER

A. Clear concrete cover shall conform to ACI 318 and unless noted otherwise.

B. For structures exposed to earth, water, or weather (such as wet wells, channels, tanks, foundation walls, etc.), the clear cover shall be 2 inches (for severe exposure).

C. The reinforcing bars of footings, base slabs, and other members in which concrete is deposited against the ground shall have 3 inches of concrete cover between it and the ground contact surface.

D. Ends of reinforcing bars shall extend up to 2 inches from the outside face of the members into which they frame or terminate.

3.03. DEVELOPMENT AND SPLICE LENGTHS

A. All splicing of reinforcing bars shall be lap-spliced with bars placed in contact with each other and wired securely.

B. Minimum lap splice or development length for reinforcing bars shall be as indicated on Contract Drawing. Special splices shown on the Contract Drawings, however, shall be lapped for the lengths indicated.

C. Splices shall not be placed at points of maximum stress. However, in instances where they are unavoidable, the splice location in every second parallel bar shall be offset by alternating at least one and a half times the splice length.

D. Base mat bottom bar splices shall not coincide with wall dowel locations. Offset adjacent bottom bar splices to avoid reinforcing bar congestion.

E. Welding of reinforcing bars shall not be allowed unless specifically approved by the Engineer.

F. Observe the rules for staggering splices in accordance with ACI and CRSI.

3.04. FIELD QUALITY CONTROL

A. The Proposer shall advise the Engineer of his intentions to place concrete at least 48 hours prior to concrete placement to allow for Special Inspections (as required) and observation of installed reinforcement and embedded accessories, including waterstop, keyways, and other items.

B. Any repairs, corrections, cleaning, removal of debris, etc., shall be accomplished prior to the start of concrete being placed.

C. Reinforcement installed within wall forms and in any deep formwork shall be checked by the Proposer and verified by the Engineer before closing the form, as well as immediately prior to placing concrete.

D. Prior to concrete deposition, reinforcement shall be free from mortar (concrete splash from previous placement), mud, loose mill and rust scale, grease, oil, or any other coatings, including ice, that would reduce bond with the concrete.

E. Where there is a delay in depositing concrete, reinforcement shall be rechecked and cleaned when necessary. Cleaning shall be done by whatever mechanical means is

necessary to return it to an acceptable condition.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01. SCOPE OF WORK

A. It is the intent of these specifications to produce high quality, dense, durable, watertight (if applicable) concrete. The Proposer will be responsible for the final in-place concrete quality. Care shall be taken in the development of mix designs and during mixing, placing, curing, and finishing to achieve the desired result. The Proposer will be responsible for repairing cracks, unsound concrete, and poor finishes to the satisfaction of the Rockland Green, at no additional cost.

B. Section includes:

1. Concrete mix design requirements.

2. Placement and care of concrete.

3. Restrictions regarding embedments in concrete.

4. Concrete testing.

5. Concrete repair (of newly cast concrete).

1.02. RELATED SECTIONS

A. Section 03200 - CONCRETE REINFORCEMENT

B. Section 03370 - CONCRETE CURING AND PROTECTION

1.03. REFERENCES

The publications listed below form a part of this specification.

A. American Concrete Institute (ACI)

1. ACI 201.1 - Guide for Conducting a Visual Inspection of Concrete in Service

2. ACI 211.1 - Selecting Proportions for Normal, Heavyweight, and Mass Concrete

3. ACI 301 - Specifications for Structural Concrete

4. ACI 302.1 - Guide for Concrete Floor and Slab Construction

5. ACI 304 - Measuring, Mixing, Transporting and Placing Concrete

6. ACI 305R - Hot Weather Concreting

7. ACI 306R - Cold Weather Concreting

8. ACI 309 - Guide for Consolidation of Concrete
9. ACI 318 - Building Code Requirements for Structural Concrete
10. ACI 350R - Code Requirements for Environmental Engineering Concrete Structures

B. American Society for Testing and Materials (ASTM)

1. ASTM C31 - Making and Curing Concrete Test Specimens in the Field
2. ASTM C33 - Concrete Aggregates
3. ASTM C39 - Compressive Strength of Cylindrical Concrete Specimens
4. ASTM C42 - Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
5. ASTM C94 - Ready-Mixed Concrete
6. ASTM C138 - Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
7. ASTM C143 - Test Method for Slump of Hydraulic-Cement Concrete
8. ASTM C150 - Portland Cement
9. ASTM C172 - Sampling Freshly Mixed Concrete
10. ASTM C231 - Air Content of Freshly Mixed Concrete by the Pressure Method
11. ASTM C260 - Air-Entraining Admixtures for Concrete
12. ASTM C295 - Petrographic Examination of Aggregates
13. ASTM C311 - Sampling and Testing Fly Ash or Natural Pozzolans for Use in Concrete
14. ASTM C457 - Determination of Air Voids in Concrete
15. ASTM C494 - Chemical Admixtures for Concrete
16. ASTM C595 - Specification for Blended Hydraulic Cements
17. ASTM C618 - Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
18. ASTM C948 - Density, Water Absorption, and Apparent Porosity of Glass-Fiber Reinforced Concrete
19. ASTM C989 - Ground Granulated Blast-Furnace Slag for Use in Concrete
20. ASTM C1116 - Fiber-Reinforced Concrete and Shotcrete
21. ASTM C1218 - Test Method for Water-Soluble Chloride in Mortar and Concrete
22. ASTM C1260 - Test for Alkali Reactivity of Aggregates

1.04. SUBMITTALS

A. Qualifications statement regarding batch plant certification.

B. Prior to submittal of concrete mix designs, submit data on all ingredients to be used in the mix designs for pre-approval. All data shall be dated within the last 12 months.

1. Certified mill tests of cementitious materials (cement, fly ash, and slag).

2. Certified tests of fine and coarse aggregates meeting requirements in Part 2 of this specification.

3. Verification of fine and coarse aggregates' potential for alkali-aggregate reactivity provided by one or more of the following:

a. Certified testing of aggregates for alkali-aggregate reactivity potential.

b. Identification by State DOT for "ASR potential."

c. Certified statement from source of aggregates pertaining to history ofalkali-aggregate reactivity.

4. Catalog cuts of concrete admixtures,

C. Concrete Mix Designs - Concrete mixes used on this project shall be either established mixes verified by "Field Test Data" or new custom laboratory designed "Trial Mixtures." Requirements for either option are as follows.

All test data shall be dated within the last 12 months. Partial submittal will not be reviewed.

1. List amount and sources of mix ingredients:

a. Cement.

b. Pozzolans (fly ash and slag).

c. Fine aggregate.

d. Coarse aggregate.

e. Water.

f. Admixtures.

g. Fibers (if required).

2. Strength Test Reports - The average strength shall be higher than the required average compressive strengths (f'cr) as per ACI 301, paragraph 4.2.3.3. Concrete supplier shall perform calculations validating proposed concrete strengths.

3. Typed letter signed by an official from concrete supplier stating that all materials for proposed mix are identical (from the same source and of the same amounts) as materials used for concrete mix in the submitted strength test reports.

4. Certified test for amount of water-soluble chloride ion (CL-) in concrete.

D. Submit catalog cut for retarding admixture.

E. Submit catalog cut for surface-applied hot weather evaporation reducer.

F. Submit a filled-in sample batch plant ticket prior to the first concrete placement. Reference batch ticket requirements in Part 3 of this specification.

G. Submit special requests for embedment of conduit, etc. Reference restrictions in Part 3 of this specification.

H. If concrete repairs are needed for newly cast concrete as indicated in Part 3 of this specification, the Proposer shall submit proposed repair products and procedures specified in Section 03732, Concrete Repair.

1.05. COORDINATION

A. Coordinate all concrete placements with work (general, site/civil, architectural, structural, electrical, HVAC, instrumentation, mechanical, plumbing, etc.) indicated in all specifications and on all Contract Drawings.

B. Coordinate installation of all cast-in (embedded) items (i.e., conduits, grating frames, hatches, anchor rods, etc.) prior to start of concrete placement. Post-installation of cast-in items into new hardened concrete is not allowed.

C. Coordinate all concrete placements with testing and inspection requirements specified herein and identified in Section 01420, Special Inspections.

D. Obtain approval on Proposer's proposed curing and protection plan prior to placement of any concrete. Reference Section 03370, Concrete Curing and Protection.

1.06. QUALIFICATIONS

A. The concrete batch plant providing concrete to this project shall be certified by the State DOT.

PART 2 PRODUCTS

2.01. CONCRETE

A. Concrete Classes and Their Use

1. Mix A - All general uses not otherwise specified or provided for below.

Mix	28-Day Compressive Strength (psi)	Coarse Aggregate Size per ASTM C33	Minimum Total Cementitious Content (lbs/CY)	Maximum Water/Cement Ratio (w/c)[1]	Air Content %[2]	Maximum Water-Soluble Chloride Ion (CL^-)
A	4,500	#57	600	0.42	6.0	0.15

(1) *These maximum water/cement ratios shall be considered for selection of supplier's mix designs. The water/cement ratio specified in the approved mix designs shall be the maximum used in production.*

(2) *Tolerance for air content is +1-1/2 percent.*

B. Air Entrainment Requirements

1. All concrete exposed to weather or liquid shall be air-entrained as specified in the above chart.

2. For interior concrete, where finishes require a lower air content than specification requires, the air content shall be adjusted accordingly with the approval of the Engineer.

C. Concrete Slump

1. Without plasticizers, concrete slump for flatwork shall not exceed 3 inches. Wall concrete, columns, and deep beams (without plasticizers) shall be placed with a maximum slump of 4 inches.

2. Concrete with superplasticizer shall be designed for a target slump of 6 inches. Mixed concrete with a slump greater than 8 inches shall not be placed on this project.

2.02. MATERIALS

A. Cement

1. Cement shall be Portland cement Type III (High early-strength cement with a maximum tri-calcium aluminate (C3A) content of 8 percent) and shall meet the requirements of ASTM C150.

If aggregates are susceptible to alkali-silica reactivity (ASR), cement shall be low alkali containing less than 0.60 percent of equivalent alkalis (Na2O + 0.658K2O) per ASTM C150, Table 2 unless other approved measures are included to mitigate ASR. Low alkali cement shall be tested frequently during construction, as outlined in Part 3, to monitor alkali levels.

B. Pozzolans

1. Fly ash shall meet the requirements of ASTM C618 Class F except as modified below:

a. Loss of Ignition, Maximum - 5.0 percent.

b. Maximum Retained on #325 Sieve - 30 percent.

2. Blast furnace slag material shall meet the requirements of ASTM C989. A blend of Portland cement and blast furnace slag shall meet the requirements of ASTM C595 and be specifically manufactured to produce higher concrete strengths and provide greater resistance to chloride penetration and sulfate attack.

C. Aggregates

1. Fine Aggregate (Sand)

a. Natural or manufactured siliceous sand.

b. Quantity of deleterious substances limited by Table 1 of ASTM C33.

c. Graded within the specified limits of ASTM C33.

2. Coarse Aggregate

a. Crushed stone or crushed gravel.

b. Quantity of deleterious substances limited by Table 3 of ASTM C33 for Class 4S aggregates.

c. Graded within the specified limits of ASTM C33.

3. Source of fine and coarse aggregates shall not have a history pertaining to alkali-aggregate reactivity. In the event that aggregate source with potential alkali-aggregate reactivity is unavoidable, at least two of the following measures shall be taken to minimize this reaction:

a. Provide low alkali cement.

b. Use fly ash (minimum 20 percent content) or slag.

c. Use lithium-based additives (proven to be effective based on testing of concrete).

D. Mixing Water - Clear and potable.

2.03. ADMIXTURES, ETC.

A. General Requirements - Admixtures other than those specified may only be used after written approval by the Engineer.

1. Admixtures shall be as manufactured by Master Builders Solutions (BASF Chemical Company); Sika Corporation; Euclid Chemical; Grace Construction Products; or equal.

2. All admixtures proposed shall be selected in advance so that the appropriate trial mixes can be made.

3. After material sources have been established and approved, these sources shall not be changed for the duration of the project.

4. The Engineer may require that a field representative of the admixture manufacturer provide occasional service in the field or batch plant to assure proper use of the admixture.

B. Air entrainment admixture shall meet the requirements of ASTM C260.

C. All concrete mixes shall contain a "water-reducing admixture" that meets the requirements of ASTM C494 Type A or a "high range water-reducing admixture" (superplasticizer) that meets the requirements of ASTM C494 Types F or G. These admixtures shall not contain chlorides.

D. Retarding Admixture - If air temperatures are expected to exceed 85 degrees F during the placement and/or finishing of any flatwork, a retarding admixture shall be used that meets the requirements of ASTM C494 Type D.

E. Evaporation Reducer - For all concrete flatwork during hot and/or windy weather conditions, apply to freshly placed concrete prior to finishing. Use BASF Chemical Company "Confilm," L&M Construction Chemicals "E-Con," Conspec (by Dayton Superior) "Aquafilm," or equal.

F. Acceleration admixtures associated with cold weather concrete shall meet the requirements of ASTM C494 Type C and shall not contain calcium chloride. (Reference Section 03370, Concrete Curing and Protection, for cold weather protection procedures.) Note that acceleration admixtures are not allowed in Mix B for liquid containment structures. Approval from Engineer shall be obtained prior to use.

PART 3 EXECUTION

3.01. PREPARATION, MIXING, AND HANDLING OF CONCRETE

A. Batch Plant Requirements - Measurement of materials at the batch plant shall be in accordance with ASTM C94.

B. The batch plant used to supply concrete for this project shall meet the following requirements:

1. Weight Hoppers - The plant shall have separate weight bins for cement and aggregate.

2. Scales - Shall measure the actual weight within an accuracy of 0.1 percent of full scale or one graduation, whichever is less. Scales shall be sealed annually by the Official Sealer of Weights and Measures.

3. Heating and Cooling of Materials

a. In cold weather, the batch plant shall be equipped to heat aggregates and water to produce concrete delivery temperatures at the project site greater than the minimum temperatures indicated below. Aggregates shall not contain ice or have frozen lumps nor shall they be heated to a temperature over 120 degrees F.

1) When ambient air temperature at time of placement is above 30 degrees F, concrete temperature must be at or above 55 degrees F.

2) When ambient air temperature at time of placement is below 30 degrees F, concrete temperature must be at or above 60 degrees F.

3) When ambient air temperature at time of placement is below 0 degrees F, concrete temperature must be at or above 65 degrees F.

b. In warm weather, the batch plant shall be equipped to cool water with ice, and cool aggregates by shading and spraying with cool water, to obtain concrete delivery temperatures at the project site of no greater than 95 degrees F. The Proposer shall consider drive time, slump loss, admixtures, flash set, etc. and reduce delivery temperatures as appropriate.

4. Moisture Content - The automated batch plant shall adjust aggregate weights dispensed based on their moisture content.

C. Mixing Methods

1. All concrete shall be ready mixed and meet the requirements of ASTM C94.

The truck mixer shall be equipped with a water tank for carrying mixing water. Water added to the mixer shall be measured to the nearest gallon by use of a water meter. For all trucks arriving on site without an operating water meter, water shall only be added manually into the back of the truck using a calibrated container. Water carried within the truck water tank shall not be used unmetered.

Water can be added to the mixer to attain initial slump, but only within the limits of the specified water/cement ratio. After addition of water, the concrete shall be mixed at least 30 revolutions in the mixing speed range.

Mixers shall meet the requirements of the "Truck Mixer and Agitator Standards" Truck Mixer Manufacturer's Bureau and shall bear their certification plate.

Trucks shall be equipped with a revolution counting device.

2. A written delivery slip or ticket, prepared and signed by the plant operator shall be made out at the proportioning plant for each truck load batch. The delivery slip shall be given to the Engineer as soon as the truck arrives at the job site, and each slip shall show the following information, which represents actual quantities of batched materials in each truck:

a. Truck number.

b. Date and time truck is batched.

c. Ticket number.

d. Mix designation of concrete.

e. Cubic yards of concrete.

f. Cement type and weight in pounds.

g. Weight in pounds of each size and type of aggregate.

h. Admixtures, weights in pounds and ounce.

i. Moisture content of fine and coarse aggregates.

j. Water added to the batch at the plant.

k. Water added to the batch during transport from plant to job site.

l. Water added to the batch at the job site.

The driver and/or testing laboratory technician shall record the number of gallons of water added during transport and at the job site. If no additional water is added, this shall be clearly indicated on the batch tickets. In no case shall the water/cement ratio be exceeded.

Any truck delivering concrete to the job site without a delivery slip will be rejected and shall immediately depart from the job site.

3. After completion of mixing, discharging may begin immediately, otherwise the mixer shall be revolved at the agitating speed.

The total time interval from when the cement makes contact with the aggregates to the completion of discharge shall not exceed 90 minutes. The Engineer may reduce the total time limit in hot weather or under unusual conditions if unsatisfactory results are obtained.

4. Mixing at the Construction Site - If the time limits specified cannot be consistently achieved by mixing at the plant or in transit, concrete shall be mixed completely in the truck mixer following the addition of the mixing water at the point of deposition.

Trucks shall be loaded first with coarse and fine aggregates and admixtures during which time the drum may be revolved or rocked. Cement shall be added last and the drum shall remain stationary after the cement is added until water is added at the project site.

Mixing shall begin at the project site after the addition of water and shall continue for a minimum of 100 revolutions or until a uniform mix has been produced. Mixing time shall not exceed 15 minutes.

The entire load shall be discharged within 30 minutes after mixing has been completed.

3.02. EMBEDMENTS IN CONCRETE

A. Embed no pipes other than electrical conduit in structural concrete.

B. Obtain approval from Engineer for any variation from the following requirements unless shown on the Drawings. Make request in writing accompanied by suitable sketch.

1. Do not cut or displace any reinforcement.

2. Do not place conduit between concrete surfaces and reinforcement.

3. Restrict O.D. of conduit to 1/4 of slab thickness. Keep within middle half ofthat thickness.

4. Any bundle of conduits shall not exceed a diameter equal to 1/4 of slab thickness.

5. Place unbundled, parallel conduits at least 6 inches apart.

6. Conduits that cross must be bent such that they cross between 45 and 90 degrees from each other.

7. Conduits that cross can touch each other, but no more than three conduits (not exceeding total height of 1/3 of slab thickness) can cross at any given location.

8. Conduits that run parallel with any reinforcement shall be kept a minimum of 2 inches clear from that reinforcement.

9. Do not embed conduit in beams.

10. Total conduit cross sectional area embedded in columns shall be less than 4 percent of the gross concrete area of columns.

3.03. CONCRETE PLACEMENT

A. The Proposer shall notify Rockland Green, Special Inspector (when required), Engineer, and testing lab a minimum of 48 hours in advance of placement to allow sufficient time for scheduling and observation of the work and for any corrective measures which are subsequently required.

B. Preparation

1. Concrete shall not be placed until all reinforcement is secured in position, nor until the forms have been completely installed and cleaned of debris; coated; form ties retightened; all sleeves, castings, pipe, conduits, anchors, forms for openings have been placed and anchored by the Proposer, nor until all water, snow, and ice have been removed from the space to be occupied by the concrete.

2. Finishing installation of reinforcing and finalization of formwork concurrent with starting of concrete placement is not acceptable.

C. All porous soil or concrete surfaces against which new concrete is to be placed shall be wetted down and dampened prior to placement. Spraying from the concrete truck hose immediately prior to placement will not be considered sufficient.

D. Concrete shall be placed in accordance with ACI 302, ACI 304, and ACI 318.

E. Concrete shall be conveyed as rapidly as practicable to the point of deposit by methods which prevent the separation or loss of the ingredients.

F. Any concrete being placed shall not be allowed to free fall more than 5 feet as measured from the point of discharge to the bottom of the formed surface. All distances greater than 5 feet shall utilize elephant trunks with hoppers.

G. When placing concrete, sufficient illumination shall be provided in the interior of the forms so that the concrete, at places of deposit, is visible.

H. Concrete shall be placed and vibrated in layers not to exceed 30 inches. Reference ACI 309.

I. Vibration shall be applied directly to the freshly-placed concrete by successive vertical penetrations of the vibrator. It shall be of sufficient duration to accomplish thorough compaction and complete embedment of reinforcement and fixtures.

"Pencil" vibrators shall be on hand and utilized where required.

Vibration shall be supplemented by forking or spading by hand in the corners of forms.

When vibrating structural slabs, the vibrator must not ride the form supporting the slab.

Since the duration of vibration required is dependent on the frequency, size of vibrator, and slump of concrete, the length of time must be determined in the field.

Vibrators shall not be used to move concrete laterally within the forms.

J. Place concrete continuously and at full depth of slabs (so as not to permit cold joints) between predetermined expansion, construction, or control joints.

3.04. PUMPING CONCRETE

A. Pumping Concrete - If the pump operator does not have direct visual contact with the location of concrete placement, two-way radio communications shall be provided.

3.05. CONCRETE FINISHING

A. All flatwork concrete shall be finished immediately after placement per Section 03350, Concrete Finishes.

B. All formed concrete shall be finished after form removal. Coordinate timing of form removal within the seven-day rubbed finish requirements per Section 03350, Concrete Finishes.

3.06. CONCRETE CURING AND PROTECTION

A. All concrete shall be cured (and protected from hot or cold weather conditions) for a minimum of three days. Submittal of proposed procedures is required; follow requirements of Section 03370, Concrete Curing and Protection.

3.10. INCOMPLETE STRUCTURES

A. Structures which are incomplete may not be capable of withstanding backfill, hydrostatic, surcharge, storage and other permanent or temporary loading conditions imposed during construction. Control of such loading conditions shall be the sole responsibility of the Proposer.

3.11. TESTING FOR QUALITY ASSURANCE

A. Rockland Green will hire and pay for the services of an independent testing laboratory to perform the testing for quality assurance. Field testing shall consist of w/c ratio verification, temperature, slump, air content, density, and tests for the compressive strength. These test results shall be used by the Proposer to assist his control of quality in order to meet specified values. Additional testing for materials verification (including fine and coarse aggregate moisture content and water absorption, etc.) shall be conducted as directed by Engineer.

Proposer shall accept the reported results from this independent testing laboratory. If Proposer is in contention with any of these results, Proposer is allowed to hire their own independent testing laboratory to perform additional testing. Proposer's costs of other independent testing laboratory will not be recompensated, regardless of test results.

B. Testing will be required for each placement in excess of 5 cubic yards.

C. Location of Field Tests - All sampling for field tests (cylinders, air content, slump, etc.) shall be performed at the delivery truck to allow proper correlation of the tests.

When concrete is being pumped, additional air content testing shall be performed at the pump discharge to monitor air content changes through the pump and to maintain specified air content at location of concrete placement.

D. The following field tests will be performed by the testing laboratory for every concrete placement:

1. Water/Cement Ratio (Calculated Method)

a. The water/cement ratio shall be calculated and recorded for each truckload of concrete delivered to the job site. This calculation shall account for all moisture in the mix including wash water, water added during transport and at the job site, and free moisture in both fine and coarse aggregates.

b. Concrete which exceeds the water/cement ratio specified in the approved mix design shall not be utilized.

2. Temperature - Shall be recorded by the testing laboratory for each batch of concrete delivered to the project.

3. Slump Test - Slump tests shall be made in the field by the testing laboratory on each batch of concrete produced, in accordance with ASTM C143.

4. Air Content Test (Fresh Concrete)

a. Test for entrained air content in accordance with ASTM C231. Concrete which does not contain the proper amount of entrained air shall not be utilized under this contract.

b. A minimum of two tests will be required for each day of operations. Also, at least one test shall be made for each 50 cubic yards and each class of concrete placed within a single day.

c. If concrete is being pumped, a test shall be performed at both the truck and the end of the pump discharge. These two tests shall be used to monitor the drop in air content due to pumping and to better regulate the air content in forthcoming concrete batches.

d. In the event that test results are outside the limits specified, additional tests shall be required to show that concrete meets the specification requirements or the concrete shall not be used on this project. These additional tests shall be paid for by the Proposer.

5. Unit Weight (Density) - The unit weight of the fresh concrete shall be measured in accordance with ASTM C138. The unit weight shall be recorded at the same interval as required for air content testing as stated above.

6. Compressive Strength Test

a. Samples of concrete will be taken and tested by the testing laboratory for compressive strength in accordance with ACI 301; ASTM C31, C39, and C172; except as modified herein.

At least one sampling will be taken for each 50 cubic yards of each class of concrete placed within a single day. No more than one sampling may be taken from a single batch to satisfy this requirement.

One sampling shall consist of eight 6-inch diameter test cylinders. Two cylinder will be tested at 7 days, two at 14 days and two at 28 days, and 2 held for testing at 56 days as needed.

Each cylinder will be identified by a tag, furnished by the Proposer, which will be hooked or wired to the side of the container.

It is the Proposer's responsibility that cylinders be stored in a temperature-controlled curing box, provided by the Proposer on the construction site, for 24 hours after they have been molded and held at a temperature between 60 degrees F and 80 degrees F. Provide a high/low thermometer to verify temperature range.

After 24 hours, the testing technician will transport the samples to the laboratory for moist curing until tested.

b. When field temperatures during the 24 hours immediately preceding the time of concrete placement have exceeded 85 degrees F, or have been less than 40 degrees F, or when freezing, hot weather, or other extraordinary field curing conditions are anticipated, or when requested by the Engineer, six additional cylinders shall be molded at each sampling for field curing.

These additional cylinders shall be located by the Proposer to be cured at the structure as near to the point where the sampled concrete was placed as practicable. These cylinders shall receive the same protection and be subject to the same environmental conditions as that portion of structure for periods of 5, 11, and 21 days from the date of molding.

The additional field-cured cylinders shall thereafter be transported to the laboratory and stored at laboratory room temperature and conditions for additional days until tested. Two specimen tested at 7 days, 2 at 14 days, and 2 held for testing at 28 days if needed.

Note: 7, 14 - and 28-day laboratory cured specimens continue to be required as control specimens. Field-cured specimens will also be considered for concrete acceptance.

c. After job site storage, concrete test cylinders shall be transported in rigid boxes specifically sized and constructed to prevent specimens from becoming damaged from tipping, falling, rolling, or bumping.

d. From laboratory cured specimens, the strength level of concrete will be evaluated for acceptance based on criteria in ACI 301, Chapter 17. Concrete is considered satisfactory if all of the following conditions are satisfied:

1) The average of 14-day cylinder tests for any three consecutive sets shall meet or exceed the strength required for the mix specified.

2) No more than 10 percent of the compressive strength test results from individual specimens shall have strengths less than that specified.

3) No single set of compressive strength test results falls below the specified strength by more than 500 psi.

e. The Proposer can request additional field-cured cylinders to verify adequate concrete strengths for early formwork removal. The Proposer shall reimburse Rockland Green for the testing of these additional cylinders.

f. In the event that the above conditions are not met and there is reason to imply that the low compressive strength results reflect actual concrete strength in the structure, additional tests shall be performed as outlined in Article 3.13.

3.12. ADDITIONAL TESTING FOR CONCRETE ACCEPTANCE

A. When unsatisfactory test results arise, additional tests as outlined below shall be provided and paid for by the Proposer.

B. Inadequate Compressive Strength - In the event that test results fail to meet the strength requirements as outlined above, the Proposer shall be responsible for costs associated with having concrete core specimens obtained from the affected area and tested.

Three cores shall be taken for each sample in which the strength requirements were not met. The drilled cores shall be obtained and tested in conformance with ASTM C42 by Rockland Green's independent testing laboratory.

A core specimen shall be taken perpendicular to the concrete surface and shall be taken from near the middle of a unit of deposit when possible and not near formed joints or obvious edges of a unit deposit.

The diameter of core specimens should be at least 4 inches. The length of specimen, when capped, shall be at least twice the diameter of the specimen. Core specimens shall not include reinforcement. On the same day as they are drilled, core holes shall be repaired with non-shrink grout.

The core specimens shall be carefully handled while transported to the laboratory. Cores shall be tested and evaluated in accordance with ASTM C442 and ACI 301, Chapter 1.6.7.

1. The concrete in question will be considered acceptable if the average of three core specimen compressive strength tests meet or exceed 85 percent of the specified strength required for the specific concrete mix. No individual core compressive strength test result shall fall below 75 percent of the specified strength.

2. Load Tests - If compressive strength requirements under the above procedure are not met by the results of core tests, then the Engineer may order load tests pursuant to ACI 318. Such tests shall be at the Proposer's expense.

C. Non-Compliant Air Content - In the event that concrete placed by the Proposer is suspected of, or is tested and shown to not have proper air content or erratic air test results are obtained as specified above, the Proposer shall engage an independent testing laboratory to obtain and test samples for air content in accordance with ASTM C457 and to recommend modification to mix components or additives. The Proposer will be responsible for remediation to the satisfaction of the Engineer/ Rockland Green.

3.13. TEST REPORTS

A. The testing laboratory shall provide a copy of field notes directly to Rockland Green's on-site representative no later than the following day.

B. Compressive strength test results shall be submitted to Rockland Green’s on-site representative, Engineer, Proposer, and concrete supplier within 2 business days following 7-, 28-, and 56-day testing.

3.14. REPAIR OF NEWLY CAST CONCRETE

A. Sub strength Concrete

1. Concrete which fails to meet the strength requirements as outlined above in Article 3.13 will be analyzed by the Engineer as to its adequacy based upon design loading and exposure conditions for the particular area of concrete in question.

2. If the concrete in question is found unacceptable based upon this analysis, that portion of the structure shall be strengthened or replaced by the Proposer at his expense. The method of strengthening or extent of replacement shall be as defined by the Engineer.

3. Concrete not requiring strengthening but still falling below the strength requirements, may be accepted by Rockland Green in accordance with the General Conditions, specifically the paragraph entitled "Acceptance of Defective Work."

B. Inadequate Air Content - Concrete which will be exposed to freeze-thaw cycles when in service, and which is found to have inadequate air content, shall be replaced to the extent defined by the Engineer.

END OF SECTION

SECTION 03370

CONCRETE CURING AND PROTECTION

PART 1 GENERAL

1.01. SECTION INCLUDES

A. Curing and protection for all concrete slabs, other flatwork (including toppings, beams, etc.), and for all walls and other vertical members (including columns, grade beams, etc.) during:

1. Normal weather conditions.

2. Hot weather conditions.

3. Cold weather conditions.

B. Limited use of curing compound.

1.02. RELATED SECTIONS

A. Section 03300 - CAST IN PLACE CONCRETE

1.03. REFERENCES

The publications listed below form a part of this specification.

A. American Concrete Institute

1. ACI 305R - Hot Weather Concreting

2. ACI 306R - Cold Weather Concreting

3. ACI 308R - Guide to Curing Concrete

B. American Society for Testing Materials

1. ASTM C171 - Sheet Materials for Curing Concrete

2. ASTM C309 - Liquid Membrane Forming Compounds for Curing Concrete.

1.04. SUBMITTALS

A. Prior to placement of any concrete, submit an outline indicating various curing and protection methods and procedures intended for use on this project during each of the following conditions:

1. Normal weather conditions.

2. Hot weather conditions.

3. Cold weather conditions.

Include procedures for slabs (and other flatwork), walls (and other vertical members), and footings.

B. Submit single-page catalog cut for curing compound with fugitive dye specifically indicated.

C. Submit single-page catalog cut for polyethylene film with material selection specifically indicated.

1.05. COORDINATION

A. Proposer's outlined curing and protection methods and procedures shall be approved prior to first concrete placement.

B. Coordinate curing, protection, and rubbed wall finish to occur simultaneously during the initial seven-day period after concrete placement. Reference Section 03350, Concrete Finishes.

C. Coordinate sequence of work to avoid loading or working on newly cast concrete for the first 24 hours.

D. Rockland Green's representative and/or Engineer shall make final determination of when hot weather or cold weather curing and protection requirements are in effect.

PART 2 PRODUCTS

2.01. CURING WATER

A. Water shall be potable.

B. Water shall be free of materials that have the potential to stain concrete.

2.02. POLYETHYLENE FILM

A. Polyethylene film shall be white (opaque) and shall meet the requirements of ASTM C171.

B. Polyethylene film used on this project shall be maintained in like new condition or shall be replaced. Rockland Green's representative shall have the final decision when condition of film becomes unacceptable.

2.03. ADMIXTURES

A. Accelerating admixtures associated with cold weather concrete are not allowed in Mix B concrete used for liquid containment structures. Refer to Section 03300, Cast-in-Place Concrete, for other concrete mixes that are allowed to consist of acceleration admixtures.

PART 3 EXECUTION

3.01. PREPARATION

A. All freshly placed concrete shall be protected from adverse weather and from defacement. As soon as the concrete has been placed and horizontal top surfaces have received their required finish, provisions shall be made for providing continuous curing and protection as required below.

3.02. NORMAL WEATHER CURING AND PROTECTION

A. Definition of Normal Conditions - All conditions not defined as either hot or cold weather.

B. Slabs and Other Flatwork

1. After finishing and immediately after the concrete surface has hardened enough to prevent dilution of the cement paste, provide continuous moist curing for at least the first 24 hours.

2. After the initial 24-hour period, cure for an additional two days with one of the following methods:

a. Cover with white polyethylene film.

b. Cover with burlap and continuous sprinkling with water.

c. Continuous water spray with no covering.

C. Walls and Other Vertical Members

1. Immediately after the concrete surface has hardened enough to prevent dilution of the cement paste, provide continuous moisture at the exposed top surface for at least the first 24 hours.

2. After the initial 24-hour period, cure for an additional two days with one of the following methods. (Note: For walls specified to receive a rubbed finish, forms must be removed and rubbed finish applied prior to the end of the seven-day curing period.

a. Leave forms in place, tight. Provide continuous moisture at the exposed top surface.

b. Leave forms in place; loosen after 24 hours. Provide continuous water at top of wall (or member) to soak all sides.

c. Remove forms, soak walls with water. Cover tightly with white polyethylene film.

d. Remove forms; cover with burlap and soak with continuous spray.

D. For the first 24 hours after concrete finishing, no work shall commence, nor shall any material be placed on concrete. The exposed concrete surfaces shall be protected from any potential damage with plywood or other means for the remaining two days of the curing period.

E. Interruptions, not to exceed a total of four hours are permitted for the purpose of layout, shoring or reshoring, finishing, or other required construction needs as long as the surface is not allowed to completely dry. Be prepared to spray the exposed surface every 15 to 30 minutes.

3.03. HOT WEATHER CURING AND PROTECTION

A. Conform to ACI 305R when concreting during hot weather except as modified below.

B. Definition of Hot Weather - When combinations of high air temperature, low relative humidity, and wind speed have the potential to cause the concrete to reach the critical evaporation rate (0.15 lbs/ft^2/h), the Proposer and his concrete supplier shall exercise precautionary measures in preparing, delivering, placing, finishing, and curing of the concrete.

Rockland Green's representative and/or Engineer shall determine if hot weather conditions are in effect in accordance with ACI 305R. Note that it is possible to have hot weather conditions with air temperatures as low as 65 degrees F if low humidity and moderate wind speeds (10 mph or greater) exist. By default, when air temperatures exceed 80 degrees F, regardless of relative humidity levels and wind speed, hot weather conditions shall be in effect.

C. Temperature of fresh concrete shall not exceed 90 degrees F. Concrete delivered at temperatures exceeding 90 degrees F shall be rejected.

D. Curing of the concrete shall begin immediately after completion of the initial finishing operation.

1. Slabs and Other Flatwork - After the initial 24-hour period of moist curing, continue wet cure for an additional six days with one of the following:

   a. Soak with water and cover with white polyethylene film.

   b. Cover with burlap and continuous sprinkling with water.

2. Walls and Other Vertical Members - After the initial 24-hour moist curing, continue wet cure for an additional six days with one of the following. (Note: See normal weather curing above for coordination of rubbed wall finish.)

   a. Leave forms in place, tight with soaker hose on top.

   b. Leave forms in place; loosen after 24 hours. Provide continuous water or double soaker hoses on top.

   c. Remove forms; soak walls with water. Cover tightly with white polyethylene film over soaker hose at top of wall.

3. Strip Footings and Isolated Column Footings (Note: Strip footings include footings of foundation (frost) walls, retaining walls, and flood walls.)

   a. After finishing, apply curing compound at twice the manufacturer's recommended application rate.

b. Curing compound shall be applied to and seamlessly cover all exposed surfaces.

c. After applying curing compound, completely cover the concrete with white polyethylene film.

E. Monitor concrete temperature for walls and slabs 20 inches thick or more. After temperature has peaked, control rate of cooling to ambient temperature at a rate of 1 degree F per hour to prevent cracking.

F. For the first 24 hours after concrete finishing, no work shall commence nor shall any material be placed on concrete. The exposed concrete surfaces shall be protected from any potential damage with plywood or other means for the remaining six days of the current period.

G. Interruptions, not to exceed a total of four hours are permitted for the purpose of layout, finishing, or other required construction needs as long as the surface is not allowed to completely dry. Be prepared to spray the exposed surface every 15 to 30 minutes.

3.04. COLD WEATHER CURING AND PROTECTION

A. Conform to ACI 306R when placing concrete during cold weather except as modified below.

B. Definition of Cold Weather - A period when for more than three consecutive days the average daily temperature drops below 40 degrees F. When temperatures above 50 degrees F occur during more than half of any 24-hour period, the concrete shall no longer be regarded as cold weather concrete. Rockland Green's representative shall monitor daily temperatures for determination of start and stop of cold weather concreting. Proposer shall comply with this determination.

C. The methods of curing and protecting the concrete shall be such as will prevent drying or freezing. Labor, equipment, and materials necessary for cold weather curing and protection (including heating) shall be on the site and set up (staged) in sufficient quantity before concrete placement begins.

D. Concrete must be cured and protected from cold weather simultaneously.

E. For the first 24 hours after concrete finishing, no work shall commence, nor shall any material be placed on concrete. The exposed concrete surfaces shall be protected from any potential damage with plywood or other means for the remaining duration of the curing and protection period.

F. Curing

1. Slabs and other flatwork shall be cured with one of the following:

a. Coat with curing compound applied at twice the recommended manufacturer's application rate.

b. Cover with polyethylene film.

2. Walls and other vertical members shall have forms left in place, tight for the first 24 hours. Apply twice the application rate of curing compound to the exposed top surface or cover with polyethylene film. After the initial 24-hour period, cure for an additional six days with one of the following:

   a. Leave forms in place, tight as above.

   b. If forms are loosened, immediately remove forms and either: (1) apply curing compound at twice the manufacturer's recommended application rate to all surfaces; or (2) cover tightly with polyethylene film.

   (Note: Coordinate with rubbed wall finish requirements.)

G. Protection

1. Protection shall proceed as follows:

   a. For Slabs and Other Flatwork

      1) Cover with blankets and/or heated enclosure as required.

   b. For Walls and Other Vertical Members (Note: Extra effort will be required to prevent freezing when using water to complete rubbed wall finishing.)

      1) Forms Left in Place, Not Loosened - Cover with blankets and/or heated enclosure as required.

      2) Forms Removed Prior To End Of Protection Period - Re-cover with blankets and/or heated enclosure as required.

2. The length of the protection period for each type of member shall be as determined in the table below.

Cold Weather Protection Period				
Type of Member	**Service Category**	**Temperature Range**	**Type I or II Cement (Days)**	**Type III Cement (Days) [1]**
Slab-On Grade	3	50°F – 70°F	6	4
Columns	3	50°F – 70°F	6	4
Walls[2]	3	50°F – 70°F	6	4
Walls[3]	4[4]	50°F – 70°F	21[5]	14[5]
Beams	4[4]	50°F – 70°F	21[5]	14[5]
Slabs (Other)[6]	4[4]	50°F – 70°F	21[5]	14[5]

[1] Obtain written approval by the Engineer for the use of Type III cement or an acceleration admixture.
[2] Walls that will not be service loaded (leak tested or backfilled) for at least 60 days after placement.
[3] Walls that are to be service loaded soon after concrete placement.
[4] Formwork shall remain in place until the end of the protection period for Service Category 4 structural members.
[5] Protection period could be shortened based on concrete achieving at least 80 percent of the required design strength as determined by testing of field-cured cylinders.
[6] All structural slabs supported by temporary formwork.

H. Suitable means shall be provided for maintaining the deposited concrete within the temperature range as defined above. Curing provisions as stated above must be in place prior to exposing concrete to heat.

Heating may be provided by using a vented heating unit, insulated blankets, or a combination of both.

1. If blankets are to be used, they should be applied to the concrete as specified in ACI 306R, Chapter 7, Charts 7.3.1-7.3.4. Special attention should be given to corners and edges of concrete members which could require about three times the thickness of insulation to maintain concrete temperature, as compared to thickness that might be required for interior spaces. Also note that excessive amounts of blankets could raise the temperature of the concrete too high which could cause an increase of thermal shrinkage and cause cracking due to thermal shock.

2. Where heated enclosures are provided, vent flue gases from combustion heating units to the outside of the enclosure. Place and direct heaters to avoid areas of overheating or drying of the concrete surface. Exposed concrete surfaces must be protected and cured. Where continuous moist curing is not practical, tightly adhered polyethylene or curing compounds shall be used.

I. Monitoring of Concrete Temperatures

1. To adjust and maintain cold weather procedures, various thermometers (supplied and maintained by the Proposer) shall be placed along concrete members that are undergoing cold weather protection, particularly at corners and edges of concrete members where it is more difficult to maintain the required temperature.

2. Monitoring of these temperatures must be done throughout the day, considering forecasted night conditions. Make timely adjustments to maintain an even temperature.

At a minimum, temperatures shall be recorded at the start of work in the morning, at noon, and at end of work day (but early enough to have time to make necessary adjustments to cold weather protection).

3. Access to these thermometers must be made available for Rockland Green's representative to perform spot-checking of the Proposer's effectiveness to achieve proper cold weather protection.

4. Provide the proper type and sufficient quantity of thermometers to determine the temperature of the concrete. As a minimum, provide, locate, and maintain at least one Hi-Low thermometer and at least two surface thermometers for each placement of concrete which is simultaneously undergoing cold weather curing and protection.

J. Interruptions to Protection

1. Measures shall be taken to ensure the concrete temperatures will not drop below 32 degrees F.

2. Interrupted time must be made up in accordance with ACI 306R, Section 7.7. Time

lost from required period of protection shall be made up with twice the number of lost degree hours.

K. After the required protection period listed in the above table, concrete shall have curing coverings removed and be allowed to gradually dry out prior to lowering temperatures to freezing as described in the following table.

Maximum Concrete Temperature Drops at End of Protection Period	
Thickness of Section, Inches	**Maximum Gradual Decrease in Surface Temperature During Any 24 Hours After End of Protection, °F**
Less than 12	50
12 to Less than 36	40
36 to 72	30
Greater than 72	20

3.05. FINAL CONCLUSION OF CURING PROTECTION PERIODS

A. At the conclusion of curing and protection periods, all concrete surfaces shall bewashed down to remove all debris and laitance material.

B. Complete removal of curing compounds will be required prior to application of coatings or other toppings. A light abrasive blast or other mechanical means may be required.

END OF SECTION

SECTION 16621

PACKAGED ENGINE GENERATOR SYSTEMS - DIESEL OUTDOOR

PART 1 GENERAL

1.1 WORK INCLUDES

A. Installation of a pre-purchased 60 kW, diesel, outdoor generator with sound attenuating enclosure for the West Nyack Transfer Station. The generator has been pre-purchased by Rockland Green, approved shop drawings are included with the Contract Documents. The Proposer shall accept delivery, rig into place and complete installation as shown on the Drawings and specified. This specification is provided for the Proposer's information and coordination, as well as to identify specific Proposer obligations for delivery of generator, testing, and startup.

B. Proposer to anchor generator enclosure to concrete pad, provide ½" stainless steel anchor bolts and hardware.

C. Proposer shall receive delivery and provide all rigging as required for installation of new generator.

D. Proposer shall provide all fuel for testing and fill tank complete prior to turning over to Rockland Green. Proposer shall assist manufacturer for specified field testing.

1.2 CODES AND STANDARDS

A. The generator set installation and on-site testing shall conform to the requirements of the following codes and standards:
1. CSA 282, 1989 Emergency Electrical Power Supply for Buildings.
2. IEEE446 – Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications.
3. NFPA37 –
4. NFPA70 – National Electrical Code. Equipment shall be suitable for use in systems in compliance to Article 700, 701, and 702.
5. NFPA99 – Essential Electrical Systems for Health Care Facilities.
6. NFPA110 – Emergency and Standby Power Systems. The generator set shall meet all requirements for Level 1 systems. Level 1 prototype tests required by this standard shall have been performed on a complete and functional unit, component level type tests will not substitute for this requirement.

B. The generator set and supplied accessories shall meet the requirements of the following standards:
1. NEMA MG1-1998 part 32. Alternator shall comply with the requirements of this standard.
2. UL142 – Sub-base Tanks.
3. UL1236 – Battery Chargers.
4. UL2200. The generator set shall be listed to UL2200 or submit to an independent third party certification process to verify compliance as installed.

C. The control system for the generator set shall comply with the following requirements.
1. CSA C22.2, No. 14 – M91 Industrial Control Equipment.
2. EN50082-2, Electromagnetic Compatibility – Generic Immunity Requirements, Part 2: Industrial.
3. EN55011, Limits and Methods of Measurement of Radio Interference

Characteristics of Industrial, Scientific and Medical Equipment.

4. FCC Part 15, Subpart B.
5. IEC8528 part 4. Control Systems for Generator Sets.
6. IEC Std 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions.
7. UL508. The entire control system of the generator set shall be UL508 listed and labeled.
8. UL1236 –Battery Chargers.

D. The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.

1.3 SUBMITTALS

A. Shop Drawings: Indicate electrical characteristics and connection requirements. Show plan and elevation views with overall and interconnection point dimensions, fuel consumption rate curves at various loads, ventilation and combustion air requirements, and electrical diagrams including schematic and interconnection diagrams.

B. Product Data: Provide data showing dimensions, weights, ratings, interconnection points, and internal wiring diagrams for engine, generator, microprocessor control panel, battery, battery rack, battery charger, exhaust silencer, vibration isolators, fuel tank, trailer and radiator.

C. Prototype Test Reports: Submittals will not be received without submission of prototype test report as specified herein.

D. Manufacturer’s Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

E. Manufacturer’s Certificate: Certify that Products meet or exceed specified requirements.

F. Alternator data indicating sub transient reactance and temperature rise rating to meet requirements specified herein.

1.4 OPERATION AND MAINTENANCE

A. Manuals: Furnish three (3) Operation and Maintenance manuals in hardcopy, bound and 1 electronic PDF copy.

B. Operation & Maintenance Data: Include instructions for routine maintenance requirements, service manuals for engine and day tank, oil sampling and analysis for engine wear, and emergency maintenance procedures.

1.5 QUALITY ASSURANCE

A. To provide proven reliability of the Generator set, three series of tests shall be performed, no exceptions taken:
1. Prototype model tests
2. Fully assembled factory production model tests
3. Field acceptance tests

B. The manufacturer shall provide documentation demonstrating satisfactory prototype and production test results. Generator sets that have not been prototype tested and Factory

Production tested as described herein shall not be acceptable.

C. Generator set Prototype Tests: These tests and evaluations must have been performed on a prototype generator set representative of the model specified. A summary of the generator set testing results shall be submittal for review. The manufacturer's standard series of components development tests on the generator system, engine and other major components shall be performed and available for review but shall not be acceptable as a substitute for a prototype testing on the complete representative generator set prototype.

D. Torsiograph Analysis and Test: The manufacturer of the generator set shall verify that the engine generator set, as configured, is free from harmful torsional stresses. The analysis shall include correlation of empirical data from tests on a representative prototype. The empirical data must include spectrum analysis of the torsional transducer output within the operating speed range of the engine generator set. Calculations based on engine and generator separately are not acceptable.

E. Temperature Rise Test: Complete thermal evaluation of a prototype generator rotor and starter must include actual measurement of internal generator and exciter temperatures by embedded detector method, and measurement of average temperature rise by resistance method. No position measured in any place in the windings may exceed the temperature rise limits of NEMA for the particular type of insulation system used. Resistance method temperature rise data shall be confirmed by a full load test on the generator set prototype to include conducted and radiated heat from the engine.

F. Short Circuit Test: A test on a prototype generator set shall have demonstrated that the generator set is designed to withstand the mechanical forces associated with a short circuit condition. With the generator set operating at rated load and speed, the generator terminals must be short circuited on all three phases for a duration of 20 seconds. At the conclusion of this test, the generator set must be capable of full load operation.

G. Endurance Run Test: A minimum of 500 continuous hours of endurance testing with a representative generator set prototype operating as defined by the manufacturer's standby rating shall have been performed. Endurance testing shall be used to verify structural soundness and durability.

H. Maximum Power Test: With the prototype generator set at normal operating temperature and with all power consuming auxiliaries in place, the maximum power available at rated speed shall be determined with the governor set at its fuel stop. The generator set shall maintain this power for a minimum of two (2) minutes.

I. Linear Vibration Test: A test for in-line motion of components occurring along a repeatable path shall meet the manufacturer's acceptable criteria.

J. Cooling System Test: A cooling system test shall demonstrate the ability of the generator set cooling system to maintain normal operating temperature while operating at full rated load and power factor at the highest ambient temperature (131 °F) of the system rating. Cooling air requirements, radiator air flow and maximum allowable restriction at radiator discharge shall be verified by this test.

K. Maximum Motor Starting KVA Test: Motor starting KVA shall be determined by test, based on a sustained RMS recovery voltage of at least 90 percent on no load voltage with the specified load KVA at near zero power factor applied to the generator set.

L. Transient Response, Steady State Speed Control and Voltage Regulation Test: Prototype

generator set tests shall demonstrate consistent performance as follows; stable voltage and frequency at all loads from no load to full rated load, consistent frequency kp on load acceptance and rejection and restoration to steady state after sudden load changes. Transient response is a complete generator set (engine, generator, exciter, and regulator) performance criteria and cannot be established on generator data alone.

M. Witness-Generator Set Factory Production Tests: On the equipment to be shipped, an five-(5) hour test shall be performed at rated load and 0.8 PF. These tests shall include certified data to document the following: run at full load, maximum power, voltage regulation, transient and steady state governing, single step load pickup and safety shutdowns. Provide a factory test record of the production testing. The equipment supplier shall coordinate with Rockland Green's engineering representative to witness the above stated factory test. Tests performed at facilities other than the manufacturer's factory shall not be acceptable.

N. Factory Test: The unit shall completely assembled and all preliminary adjustments made before the test is initiated. 60 KW genset shall be tested with the complete radiator and fan assembly to be shipped. Outside radiator, heat exchanger attachments shall not be acceptable.

O. Testing Procedure:
1. Test diesel-alternator unit at 0.8 PF in the following sequence:
2. 0.5 hour at ¼ load.
3. 0.5 hours at ½ load.
4. 0.5 hours at ¾ load.
5. 2.5 hours at full load.

P. Above testing shall be strip chart recorded and certified. During this test, the following measurements shall be taken and recorded on a certified report format:
1. Barometric Pressure.
2. Intake Air Pressure.
3. RPM.
4. Output voltage per phase.
5. Output amperes per phase.
6. Power Factor.
7. KW.
8. Winding temperature.
9. Transient response testing sequence:
10. 0-25%, 25%-0.
11. 0-50%, 50%-0.
12. 0-75%, 75%-0.
13. 0-100%, 100%-0.

Q. Above testing shall be strip chart recorded. Provide necessary equipment and instruments to measure voltage dips and frequency dips. Comparison shall be made to the herein specified alternator performance characteristics prior to acceptance.

R. Field Acceptance Tests: Generator supplier shall provide and conduct a four (4) hour load bank test at unity power factor for the generator set. Proposer must provide portable load bank for testing generator set at 100% load. Load bank test shall test each generator at full nameplate KW ratings. Generator manufacturer's representative shall record test data, as described below. Test data shall be tabulated and typed for submission and approval by the engineer for final acceptance. No handwritten field notes will be allowed.

S. Initial startup and field acceptance tests are to be conducted by the authorized representative of the system manufacturer who supplies the equipment. Proposer responsible for protection of testing equipment and any additional cable, etc., required if equipment cannot be located internally during testing.

T. Test data shall be collected and recorded on the following: Time of day, coolant temperature, operating oil pressure, battery charging rate, cranking time, crank-to-rated frequency time, voltage and frequency overshoot, load assumption-to-steady state voltage and frequency stabilization time, operating voltage, frequency, current, kilowatts and power factor. All data shall be taken every fifteen (15) minutes.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum ten (10) years documented experience, and with an authorized distributor offering 24 hour parts and service availability within 50 miles of the project. Proposed engine/generator combination shall have been in production a minimum of five (5) years.

B. Supplier: Authorized distributor of specified manufacturer with minimum five (5) years documented experience with specified products and factory-trained service technicians.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70, NFPA 110, and NFPA 101.

B. Furnish Products listed and classified by Underwriters Laboratories as suitable for purpose specified and indicated.

1.8 PRE-INSTALLATION CONFERENCE

A. Convene one (1) week prior to commencing work of this Section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site.

B. Accept unit on site mounted on trailer. Inspect for damage. Provide written verification that Genset tested and Genset received are one and the same.

C. Protect equipment from dirt and moisture by securely wrapping in heavy plastic during construction.

1.10 EXTRA MATERIALS

A. Provide two (2) of each fuel, oil and air filter element, engine belts and hoses.

1.11 WARRANTY

A. A no deductible comprehensive warranty shall be provided for all products against defects in materials and workmanship for a five-year or 1500 hour period from the start-up date. Warranty shall cover all costs of covered repairs, including travel expenses.

1.12 SERVICE AGREEMENT

A. Manufacturer shall provide Rockland Green with a two (2) year service agreement that includes changing all fluids and filters once a year and a minor inspection six (6) months after each change.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Approved manufacturer:
1. Cummins Power Generation, model C60D6C rated for STANDBY POWER with UC3D Frame Alternator as distributed by Cummins Power Systems LLC, 890 Zerega Avenue, Bronx, NY 10473. Contact Edward Cheung: 718-892-2400, ed.cheung@cummins.com.

B. It is intended that all products specified herein be of standard ratings, therefore, the KW and KVA, starting KVA and maximum allowable voltage dip, ratings, etc., shall be the manufacturer's next size or rating to exactly meet the specifications. No exceptions.

2.2 DIESEL ENGINE-GENERATOR SET

A. Ratings
1. The generator set shall operate at 1800 rpm and at a voltage of: 120/240 Volts AC, 1-phase, 3-wire, 60 hertz.
2. The generator set shall be rated at 60 kW, 75 kVA at 0.8 PF, standby rating, based on site conditions of: Altitude 1,000 ft., ambient temperatures up to 131 degrees F with seismic designed enclosure.

B. Performance
1. Voltage regulation shall be plus or minus 0.5 percent for any constant load between no load and rated load. Random voltage variation with any steady load from no load to full load shall not exceed plus or minus 0.5 percent.
2. 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 0.25%.
3. The diesel engine-generator set shall accept a single step load of 100% nameplate kW and power factor, less applicable derating factors, with the engine-generator set at operating temperature.
4. Motor starting capability shall be a minimum of 423 kVA. The generator set shall be capable of recovering to a minimum of 90% of rated no load voltage following the application of the specified kVA load at near zero power factor applied to the generator set.
5. The alternator shall produce a clean AC voltage waveform, with not more than 5% total harmonic distortion at full linear load, when measured from line to neutral, and with not more than 3% in any single harmonic, and no 3rd order harmonics or their multiples. Telephone influence factor shall be less than 40.
6. The generator set shall be certified by the engine manufacturer to be suitable for use at the installed location and rating, and shall meet all applicable exhaust emission requirements at the time of commissioning.
7. The generator shall have a minimum surge KW rating of 72 KW.
8. Sustained short-circuit current: for a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 8 seconds without damage to generator system components.

For a 1-phase, bolted short circuit at system output terminals, system shall regulate both voltage and current to prevent over-voltage conditions on the non-faulted phases.

C. Construction
1. 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.
2. All switches, lamps, and meters in the control system shall be oil-tight and dust-tight. All active control components shall be installed within a UL/NEMA 3R enclosure. There shall be no exposed points in the control (with the door open) that operate in excess of 50 volts.

D. Connections
1. The generator set load connections shall be composed of silver or tin plated copper bus bars, drilled to accept mechanical or compression terminations of the number and type as shown on the drawings. Sufficient lug space shall be provided for use with cables of the number and size as shown on the drawings.
2. Power connections to auxiliary devices shall be made at the devices,[with required protection located at a wall-mounted common distribution panel] If walk-in enclosure.
3. Generator set control interfaces to other system components shall be made on a permanently labeled terminal block assembly. Labels describing connection point functions shall be provided.

2.3 ENGINE AND ENGINE EQUIPMENT

A. The engine shall be diesel, EPA TIER 3 Certified, 4 cycle, 4 cylinder, radiator and fan cooled. Minimum displacement shall be 272 cubic inches. The horsepower rating of the engine at its minimum tolerance level shall be sufficient to drive the alternator and all connected accessories. Two cycle engines are not acceptable.

B. A digital electronic governor system shall provide automatic isochronous frequency regulation. The governing system dynamic capabilities shall be controlled as a function of engine coolant temperature to provide fast, stable operation at varying engine operating temperature conditions. The control system shall actively control the fuel rate and excitation as appropriate to the state of the generator set. Fuel rate shall be regulated as a function of starting, accelerating to start disconnect speed, accelerating to rated speed. The governing system shall include a programmable warm up at idle and cooldown at idle function. While operating in idle state, the control system shall disable the alternator excitation system.

C. Skid-mounted radiator and cooling system rated for full load operation in 131 degrees F (55 degrees C) ambient as measured at the alternator air inlet. Radiator fan shall be suitable for use in a system with 0.5 in H_2O restriction. Radiator shall be sized based on a core temperature that is 20F higher than the rated operation temperature, or prototype tested to verify cooling performance of the engine/radiator/fan operation in a controlled environment. Radiator shall be provided with a duct adapter flange. The equipment manufacturer shall fill the cooling system with a 50/50-ethylene glycol/water mixture prior to shipping. Rotating parts shall be guarded against accidental Electric starter(s) capable of three complete cranking cycles without overheating.

2.4 ENGINE ACCESSORY EQUIPMENT

A. The engine for the generator shall include the following accessories:
   1. Positive displacement, contact.
   2. Mechanical, full pressure, lubrication oil pump.
   3. Full flow lubrication oil filters with replaceable spin-on canister elements and dipstick oil level indicator.
   4. An engine driven, mechanical, positive displacement fuel pump. Fuel filter with replaceable spin-on canister element. Fuel cooler, suitable for operation of the generator set at full rated load in the ambient temperature specified shall be provided if required for operation due to the design of the engine and the installation.
   5. Replaceable dry element air cleaner with restriction indicator.
   6. Flexible supply and return fuel lines.
   7. Engine mounted battery charging alternator, 40-ampere minimum, and solid-state voltage regulator.

B. Coolant heater
   1. Engine mounted, thermostatically controlled, coolant heater(s) for each engine. Heater voltage shall be as shown in the project drawings. The coolant heater shall be UL499 listed and labeled.
   2. The coolant heater shall be installed on the engine with silicone hose connections. Steel tubing shall be used for connections into the engine coolant system wherever the length of pipe run exceeds 12 inches. The coolant heater installation shall be specifically designed to provide proper venting of the system. The coolant heaters shall include provisions to isolate the heater for replacement of the heater element without draining the coolant from the generator set. The quick disconnect/automatic sealing couplers shall allow the heater element to be replaced without draining the engine cooling system or significant coolant loss.
   3. The coolant heater shall be provided with a 24VDC thermostat, installed at the engine thermostat housing. An AC power connection box shall be provided for a single AC power connection to the coolant heater system.
   4. The coolant heater(s) shall be 120V and sized as recommended by the engine manufacturer to warm the engine to a minimum of 104F (40C) in a 40F (4C) ambient, in compliance with NFPA110 requirements, or the temperature required for starting and load pickup requirements of this specification.

C. Provide vibration isolators, spring/pad type, quantity as recommended by the generator set manufacturer. Isolators shall include seismic restraints if required by site location.

D. Starting and Control Batteries shall be calcium/lead antimony type, 24 volt DC, sized as recommended by the engine manufacturer, complete with battery cables and connectors. The batteries shall be capable of a minimum of three complete 15-second cranking cycles at 40F ambient temperature when fully charged.

E. Provide exhaust silencer(s) for each engine of size and type as recommended by the generator set manufacturer and approved by the engine manufacturer. The mufflers shall be critical grade. <u>Exhaust system shall be installed inside the sound enclosure.</u>

F. A UL listed/CSA certified 12 amp voltage regulated battery charger shall be provided for each engine-generator set. The charger may be located in an automatic transfer switch, or may be wall mounted, at the discretion of the installer. Input AC voltage and DC output voltage shall be as required. Chargers shall be equipped with float, taper and equalize charge settings. Operational monitors shall provide visual output along with individual form C contacts rated at 4 amps, 120 VAC, 30VDC for remote indication of:

Loss of AC power - red light
Low battery voltage - red light
High battery voltage - red light
Power ON - green light (no relay contact)

G. Charger shall include an Analog DC voltmeter and ammeter, 12 hour equalize charge timer, and AC and DC fuses.

2.5 AC ALTERNATOR

A. The AC generator 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 insulation system and shall be UL1446 listed. Actual temperature rise measured by resistance method at full load shall not exceed 80 degrees Centigrade.

B. 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.

C. A permanent magnet generator (PMG) shall be included to provide a reliable source of excitation power for optimum motor starting and short circuit performance. The PMG and controls shall be capable of sustaining and regulating current supplied to a single phase or three phase fault at approximately 300% of rated current for not more than 10 seconds.

D. The subtransient reactance of the alternator shall not exceed 10.7 percent for 240VAC, based on the 80°C rise rating.

E. Alternator shall be rated for a minimum of 72 KW at 80°C, 240 VAC standby.

2.6 ENGINE GENERATOR SET CONTROL

A. Generator set Control. The generator set shall be provided with a microprocessor-based control system that is designed to provide automatic starting, monitoring, and control functions for the generator set. The control system shall also be designed to allow local monitoring and control of the generator set, and remote monitoring and control as described in this specification.

B. The control shall be mounted on the generator set or may be mounted in a free-standing panel next to the generator set if adequate space and accessibility is available. The control shall be vibration isolated, and prototype tested to verify the durability of all components in the system under the vibration conditions encountered.

C. Control Switches
1. Mode Select Switch. The mode select switch shall initiate the following control modes. When in the RUN or MANUAL position the generator set shall start and accelerate to rated speed and voltage as directed by the operator. A separate push-button to initiate starting is acceptable. 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 a remote device to start and accelerate to rated speed and voltage.
2. EMERGENCY STOP switch. Switch shall be Red "mushroom-head" push-button. Depressing the emergency stop switch shall cause the generator set to immediately shut down and be locked out from automatic restarting.

3. 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.
4. PANEL LAMP switch. Depressing the panel lamp switch shall cause the entire panel to be lighted with DC control power. The panel lamps shall automatically be switched off 10 minutes after the switch is depressed, or after the switch is depressed a second time.

D. Generator Set AC Output Metering. The generator set shall be provided with a metering set including the following features and functions:
1. Digital metering set, .5% accuracy, to indicate generator RMS voltage and current, frequency, output current, output KW, KW-hours, and power factor. Generator output voltage shall be available in line-to-line and line-to-neutral voltages, and shall display all three-phase voltages (line to neutral or line to line) simultaneously.
2. Analog voltmeter, ammeter, frequency meter, power factor meter, and kilowatt (KW) meter. Voltmeter and ammeter shall display all three phases. Meter scales shall be color coded in the following fashion: green shall indicate normal operating condition, amber shall indicate operation in ranges that indicate potential failure, and red shall indicate failure impending. Metering accuracy shall be within 1% at rated output. Both analog and digital metering are required.
3. The control system shall monitor the total load on the generator set, and maintain data logs of total operating hours at specific load levels ranging from 0 to 110% of rated load, in 10% increments. The control shall display hours of operation at less than 30% load and total hours of operation at more than 90% of rated load.
4. The control system shall log total number of operating hours, total kWH, and total control on hours, as well as total values since reset.

E. Generator Set Alarm and Status Display.
1. The generator set control shall include LED alarm and status indication lamps. The lamps shall be high-intensity LED type. The lamp condition shall be clearly apparent under bright room lighting conditions. Functions indicated by the lamps shall include:
   a. The control shall include five configurable alarm-indicating lamps. The lamps shall be field adjustable for any status, warning, or shutdown function monitored by the genset. They shall also be configurable for color, and control action (status, warning, or shutdown).
   b. The control shall include green lamps to indicate that the generator set is running at rated frequency and voltage, and that a remote start signal has been received at the generator set. The running signal shall be based on actual sensed voltage and frequency on the output terminals of the generator set.
   c. The control shall include a flashing red lamp to indicate that the control is not in automatic state, and red common shutdown lamp.
   d. The control shall include an amber common warning indication lamp.
2. The generator set control shall indicate the existence of the warning and shutdown conditions on the control panel. All conditions indicated below for warning shall be field-configurable for shutdown. Conditions required to be annunciated shall include:
   low oil pressure (warning)
   low oil pressure (shutdown)
   oil pressure sender failure (warning)
   low coolant temperature (warning)
   high coolant temperature (warning)
   high coolant temperature (shutdown)
   high oil temperature (warning)

engine temperature sender failure (warning)
low coolant level (warning)
fail to crank (shutdown)
fail to start/overcrank (shutdown)
overspeed (shutdown)
low DC voltage (warning)
high DC voltage (warning)
weak battery (warning)
low fuel-daytank (warning)
high AC voltage (shutdown)
low AC voltage (shutdown)
under frequency (shutdown)
over current (warning)
over current (shutdown)
short circuit (shutdown)
ground fault (warning) (optional--when required by code or specified)
over load (warning)
emergency stop (shutdown)
(4) configurable conditions

3. Provisions shall be made for indication of four customer-specified alarm or shutdown conditions. Labeling of the customer-specified alarm or shutdown conditions shall be of the same type and quality as the above-specified conditions. 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.

F. Engine Status Monitoring.

1. The following information shall be available from a digital status panel on the generator set control

engine oil pressure (psi or kPA)
engine coolant temperature (degrees F or C)
engine oil temperature (degrees F or C)
engine speed (rpm)
number of hours of operation (hours)
number of start attempts
battery voltage (DC volts)

2. The control system shall also incorporate a data logging and display provision to allow logging of the last 10 warning or shutdown indications on the generator set, as well as total time of operation at various loads, as a percent of the standby rating of the generator set.

2.7 ENGINE CONTROL FUNCTIONS

A. The control system provided shall include a cycle cranking system, which allows for user selected crank time, rest time, and # of cycles. Initial settings shall be for 3 cranking periods of 15 seconds each, with 15-second rest period between cranking periods.

B. The control system shall include an idle mode control, which allows the engine to run in idle mode in the RUN position only. In this mode, the alternator excitation system shall be disabled. Total duration of operating time in the idle mode shall be controlled by the system, to prevent degradation of the engine capabilities due to excess operating time at idle.

C. The control system shall include an engine governor control, which functions to provide steady state frequency regulation as noted elsewhere in this specification. The governor control shall include adjustments for gain, damping, and a ramping function to control engine speed and limit exhaust smoke while the unit is starting.

D. The control system shall include time delay start (adjustable 0-300 seconds) and time delay stop (adjustable 0-600 seconds) functions.

E. The control system shall include sender failure monitoring logic for speed sensing, oil pressure, and engine temperature which is capable of discriminating between failed sender or wiring components, and an actual failure condition.

2.8 ALTERNATOR CONTROL FUNCTIONS

A. The generator set shall include a full wave rectified automatic digital voltage regulation system that is matched, and prototype tested by the engine manufacturer with the governing system provided. It shall be immune from misoperation due to load-induced voltage waveform distortion and provide a pulse width modulated output to the alternator exciter. The voltage regulation system shall be equipped with three-phase line to neutral RMS sensing and shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The system shall include a torque-matching characteristic, which shall reduce output voltage in proportion to frequency below an adjustable frequency threshold. Torque matching characteristic shall be adjustable for roll-off frequency and rate and be capable of being curve-matched to the engine torque curve with adjustments in the field. The voltage regulator shall include adjustments for gain, damping, and frequency roll-off. Adjustments shall be broad range, and made via digital raise-lower switches, with an alphanumeric LED readout to indicate setting level. Rotary potentiometers for system adjustments are not acceptable.

B. Controls shall be provided to monitor the output current of the generator set and initiate an alarm (over current warning) when load current exceeds 110% of the rated current of the generator set on any phase for more than 60 seconds. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (over current shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.

C. Controls shall be provided to individually monitor all three phases of the output current for short circuit conditions. The control/protection system shall monitor the current level and voltage. The controls shall shut down and lock out the generator set when output current level approaches the thermal damage point of the alternator (short circuit shutdown). The protective functions provided shall be in compliance to the requirements of NFPA70 article 445.

D. Controls shall be provided to monitor the KW load on the generator set, and initiate an alarm condition (over load) when total load on the generator set exceeds the generator set rating for in excess of 5 seconds. Controls shall include a load shed control, to operate a set of dry contacts (for use in shedding customer load devices) when the generator set is overloaded.

E. An AC over/under voltage monitoring system that responds only to true RMS voltage conditions shall be provided. The system shall initiate shutdown of the generator set when

alternator output voltage exceeds 110% of the operator-set voltage level for more than 10 seconds, or with no intentional delay when voltage exceeds 130%. Under voltage shutdown shall occur when the output voltage of the alternator is less than 85% for more than 10 seconds.

F. When required by National Electrical Code or indicated on project drawings, the control System shall include a ground fault monitoring relay. The relay shall be adjustable from 3.8-1200 amps and include adjustable time delay of 0-10.0 seconds. The relay shall be for indication only, and not trip or shut down the generator set. Note bonding and grounding requirements for the generator set and provide relay that will function correctly in system as installed.

2.9 OTHER CONTROL FUNCTIONS

A. A battery monitoring system shall be provided which initiates alarms when the DC control and starting voltage is less than 25VDC or more than 32 VDC. During engine cranking (starter engaged), the low voltage limit shall be disabled, and DC voltage shall be monitored as load is applied to the battery, to detect impending battery failure or deteriorated battery condition.

2.10 GENERATOR MAIN LINE CIRCUIT BREAKER

A. The generator set shall be provided with a mounted main line circuit breaker, rated 300 amps. The circuit breaker shall incorporate an electronic trip unit that operates to protect the alternator under all overcurrent conditions, or a thermal-magnetic trip with other overcurrent protection devices that positively protect the alternator under overcurrent conditions. The supplier shall submit time overcurrent characteristic curves and thermal damage curve for the alternator, demonstrating the effectiveness of the protection provided.

B. In addition to the above main line breaker, the generator set shall be provided with a utility grade protective relay, designed to provide thermal overload protection for the alternator, and performance certified for that purpose by a 3rd party testing organization. The supplier shall submit time overcurrent characteristic curves and thermal damage curve for the alternator, demonstrating the effectiveness of the protection provided. Relay shall be installed to allow shutdown of the generator excitation system on an alternator overload condition, with the engine operating for a cool-down period before shutdown. The relay shall not include an instantaneous trip function.

2.11 OUTDOOR WEATHER-PROTECTIVE SOUND ATTENUATED ENCLOSURE

A. Construction:
1. Steel - UL2200 listed Sound Attenuated, Weatherproof Genset Enclosure
   a. Package shall comply with the requirements of the NEC for all wiring materials and components.
   b. Sound attenuation rating of 70.5 dBA @ 7m.
   c. The enclosure shall be designed in which allows generator set to operate at full rated load in an ambient temperature of up to 50° C.

B. The enclosure will consist of a cambered roof, two sidewalls, two end walls, and a usable 250 Gallon fuel tank base, incorporating prepainted aluminum construction and application-specific non-hydroscopic acoustic insulation, air handling equipment designed

to provide the specified level of sound attenuation.

C. Construction:

1. Louvers: Equipped with bird screen to permit air circulation when engine is not running while excluding birds and rodents.

2. Hinged Doors: With padlocking provisions. Restraint/Hold back hardware to prevent door to keep door open at 180 degrees during maintenance. Rain lips over all doors.

3. Exhaust System:

a. Muffler Location: Within enclosure.

4. Hardware: All hardware and hinges shall be stainless steel.

5. Wind Rating: Wind rating shall be 150 mph

6. Mounting Base: Suitable for mounting on sub-base fuel tank or housekeeping pad.

7. A weather protective enclosure shall be provided which allows the generator set to operate at full rated load with a static pressure drop equal to or less than 0.5 inches of water.

8. Inlet ducts shall include rain hoods.

D. Exhaust silencer shall be installed inside enclosure. The exhaust shall exit the enclosure through a rain collar and terminate with rain cap.

E. Engine Cooling Airflow through Enclosure: Housing shall provide ample airflow for engine generator operation at rated load in an ambient temperature of 50 deg C.

1. Louvers: Fixed-engine, cooling-air inlet and discharge.

2. Motorized Louvers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating. Dampers shall be of a “fail open” design to allow airflow in the event of failure.

F. Site Provisions: Lifting of complete assembly of engine generator, enclosure, and sub-base fuel tank shall be designed to be lifted into place as a single unit, using spreader bars.

G. The enclosure shall include flexible coolant and lubricating oil drain lines that extend to the exterior of the enclosure with internal drain valves.

H. External radiator fill provision must be provided.

I. Doors shall be recessed, lockable with retainers to hold doors open for easy access.

J. Inlet of enclosure shall be provided with rodent barriers.

2.12 SUBBASE FUEL TANK

A. Provide a sub-base nominal 250 gallon fuel tank for the generator set. The sub-base fuel tank shall be UL142 listed and labeled. Installation shall be in compliance to NFPA 37. The fuel tank shall be a double-walled, steel construction and include the following features:
1. Emergency tank and basin vents.
2. Mechanical level gauge.
3. Fuel supply and return lines, connected to generator set with flexible fuel lines as recommended by the engine manufacturer and in compliance to UL2200 and NFPA 37 requirements.
4. Leak detection provisions, wired to the generator set control for local and remote alarm indication.
5. High and low level float switches to indicate fuel level. Wire switches to generator control for local and remote indication of fuel level.
6. Basin drain.
7. Integral lifting provisions.
8. Electrical stub up(s).
9. Lockable fuel fill.
10. Sub-base tank shall include a welded steel containment basin, sized at a minimum of 110% of the tank capacity to prevent escape of fuel into the environment in the event of tank rupture.

PART 3 EXECUTION

3.1 ACCEPTANCE

A. Equipment shall be initially started and operated by representatives of the manufacturer.

B. All equipment shall be physically inspected for damage. Scratches and other installation damage shall be repaired prior to final system testing. Equipment shall be thoroughly cleaned to remove all dirt and construction debris prior to final testing of the system.

C. Proposer shall provide all fuel for start-up and testing. Proposer shall fill tank completely prior to turning over to Rockland Green.

3.2 TRAINING

A. The equipment supplier shall provide training for the facility operating personnel covering operation and maintenance of the equipment provided. The training program shall be not less than two (2) four (4) hours sessions in duration and the class size shall be limited to five (5) persons. Training date shall be coordinated with the facility Rockland Green.

3.3 DEMONSTRATION

A. Provide systems demonstration. Electric Proposer shall provide fuel for testing and shall fill tank completely after all testing is done and before turning over to Rockland Green.

B. Describe loads connected to standby system and restrictions for future load additions.

C. Simulate power outage by interrupting normal source and demonstrate that system operates to provide standby power.

END OF SECTION

SECTION 26 36 13

ENCLOSED TRANSFER SWITCHES

PART 1 GENERAL

1.01 SUMMARY

A. Installation of a pre-purchased automatic transfer switch. The automatic transfer switch has been pre-purchased by Rockland Green, approved shop drawings are included with the Contract Documents. The Proposer shall accept delivery, rig into place and complete installation as shown on the Drawings and as specified. The Proposer shall assist the manufacturer with specified field testing. This specification is provided for the Proposer's information and coordination.

1.02 RELATED SECTIONS

A. Section 26 05 00 - ELECTRICAL WORK

B. Section 26 32 14 – PACKAGED ENGINE GENERATOR SYSTEMS – DIESEL OUTDOOR

1.03 REFERENCES

A. NFPA 70 - National Electrical Code.

B. NEMA ICS 1 - General Standards for Industrial Control and Systems.

C. NEMA ICS 2 - Standards for Industrial Control Devices, Controllers, and Assemblies.

D. NEMA ICS 6 - Enclosures for Industrial Controls and Systems.

E. UL 891 - According to this UL Standard, the equipment shall be labeled: "Suitable for use only as service equipment."

F. UL 1008 - Standard for Transfer Switch Equipment

1.04 QUALIFICATIONS

A. Manufacturer - Company specializing in manufacturing the products specified in this section with minimum 20 years' documented experience and with service facilities within 50 miles of the project.

B. Supplier - Authorized distributor of specified manufacturer with minimum 10 years' documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect, and handle products to site.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to internal components, enclosure, and finish.

1.06 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.07 MAINTENANCE SERVICE

A. Furnish service and maintenance of transfer switch for one year from date of Substantial Completion.

1.08 MAINTENANCE MATERIALS

A. Provide two of each kind of special tools required for maintenance.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Cummins OTECC series (design basis, automatic transfer switches).

2.02 AUTOMATIC TRANSFER SWITCH

A. Description - NEMA ICS 10, automatic transfer switch (ATS).

B. The electrical operator shall be a single-solenoid mechanism, momentarily energized. Main operators which include overcurrent disconnect devices will not be accepted.

C. The switch shall be mechanically interlocked to ensure only one of two possible positions, normal or emergency.

D. The switch shall be positively locked and unaffected by momentary outages so that contact pressure is maintained at a constant value and temperature rise at the contacts is minimized for maximum reliability and operating life.

E. All main contacts shall be silver composition. Switches rated 600 amperes and above shall have segmented, blow-on construction for high withstand current capability and be protected by separate arcing contacts.

F. Inspection of all contacts shall be possible from the front of the switch without disassembly of operating linkages and without disconnection of power conductors. A manual operating handle shall be provided for maintenance purposes. The handle shall permit the operator to manually stop the contacts at any point throughout their entire travel to inspect and service the contacts when required.

G. Designs utilizing components of molded-case circuit breakers, contactors, or parts thereof which are not intended for continuous duty, repetitive switching or transfer between two active power sources are not acceptable.

H. Where neutral conductors are to be solidly connected as shown on the plans, a neutral conductor terminal plate with fully-rated AL-CU pressure connectors shall be provided.

2.03 SERVICE CONDITIONS

A. Service Conditions - NEMA ICS.

B. Temperature - 105 degrees F.

C. Altitude - 100 feet.

2.04 RATINGS

A. Voltage - 120/240 volts, 1 phase, 3 wire, 60 Hertz.

B. Switched Poles - Two.

C. Load Inrush Rating - Combination load.

D. Continuous Rating – 400 amperes, or as shown on the drawings.

E. Interrupting Capacity - 400 percent of continuous rating.

F. Withstand Current Rating - The ATS shall be rated to close on and withstand the available rms symmetrical short circuit current at the ATS terminals with the type of overcurrent protection shown on the plans.

2.05 PRODUCT OPTIONS AND FEATURES

A. Indicating Light Emitting Diode Lights - Mount in cover of enclosure, one to indicate when the ATS is connected to normal source (green), one to indicate when the ATS is connected to emergency source (red), one to indicate when the normal source is available (green), and one to indicate when the emergency source is available (red).

B. Emergency Switch - Mount in cover of enclosure to initiate manual transfer to emergency source.

C. Normal Switch - Mount in cover of enclosure to initiate manual transfer to normal source.

D. Transfer Switch Auxiliary Contacts - Contacts rated 10 amps, 480VAC shall be provided consisting of one contact, closed when the ATS is connected to normal source and one contact closed, when the ATS is connected to emergency source.

E. Normal Source Monitor - The voltage of each phase of the normal source shall be monitored, with pickup adjustable from 85 to 100 percent and dropout adjustable from 75 to 98 percent of pickup setting.

F. Alternate Source Monitor - Single-phase voltage sensing of the emergency source shall be provided, with a pickup voltage adjustable from 85 to 100 percent and frequency sensing with pickup adjustable from 90 to 100 percent.

G. In-phase monitor.

H. Solid neutral.

2.06 ENCLOSURE

A. Enclosure - ICS 6, NEMA 3R, secured outer door.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surface is suitable for transfer switch installation.

3.02 INSTALLATION

A. Install transfer switches in accordance with manufacturer's instructions.

B. Provide engraved plastic nameplates under the provisions of Section 26 05 00, Electrical Work.

3.03 MANUFACTURER'S FIELD SERVICES

A. Prepare and start systems.

3.04 DEMONSTRATION

A. Demonstrate operation of transfer switch in normal and emergency modes.

3.05 TESTS AND CERTIFICATION

A. The manufacturer shall provide a notarized letter certifying compliance with all of the requirements of this specification including compliance with the above codes and standards and withstand and closing ratings. The certification shall identify, by serial number(s), the equipment involved. No exceptions to the specifications, other than those stipulated at the time of the submittal, shall be included in the certification.

B. The manufacturer shall be certified to the ISO 9001 International Quality Standard and the manufacturer shall have third party certification verifying quality assurance in design/development, production, installation, and servicing in accordance with ISO 9001.

3.06 SERVICE REPRESENTATION

A. The ATS/MTS manufacturer shall maintain a local service center within a 50-mile radius of the job location. The service center's personnel must be factory trained and must be on call 24 hours per day, 365 days per year.

The manufacturer shall maintain records of each switch, by serial number, for a minimum of 20 years.

END OF SECTION

APPENDIX E

DRAWINGS

RFP 2023-02 - INSTALLATION OF A NEW 60KW GENERATOR

WEST NYACK TRANSFER STATION, WEST NYACK, NEW YORK

APRIL 18, 2023

EDR JOB #: 20098

Rockland Green
Reduce
Recycle
Recover

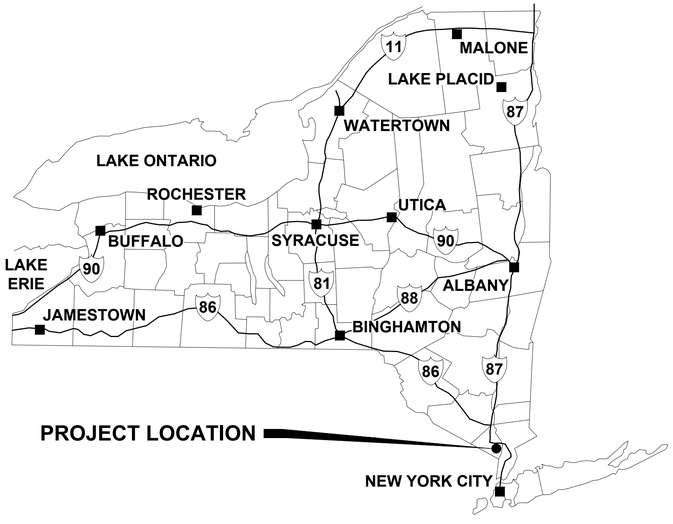
EDR
a better environment

Environmental Design & Research,
Landscape Architecture, Engineering & Environmental Services, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
P. 315.471.0688

PROJECT IMAGE / MAP:

SCALE: NTS

DRAWING INDEX:



NOTE: LIST OF ABBREVIATIONS ARE STANDARDS OF THIS OFFICE AND NOT ALL ARE USED.

ABBREVIATIONS:

A or AMP - AMPERE, AMPS
AC - ALTERNATING CURRENT
AF - AMPERE FRAME SIZE
AFF - ABOVE FINISHED FLOOR
AFG - ABOVE FINISHED GRADE
AIC - AMPS INTERRUPTING CURRENT
ALT - ALTERNATOR
AM - AMMETER
ANN - ANNUNCIATOR
AS - AMMETER SWITCH
ASV - AIR SOLENOID VALVE
AT - AMPERE TRIP RATING
ATS - AUTOMATIC TRANSFER SWITCH
AUX - AUXILIARY
AWG - AMERICAN WIRE GAUGE
BB - CK BOOST
BKR - BREAKER
BTS - BEARING TEMPERATURE SENSOR
C or COND - CONDUIT
C&W - CONDUIT & WIRE
CA - CABLE
CB - CIRCUIT BREAKER
CDRS - CONDUCTORS
CIRC - CIRCUIT
CLF - CURRENT LIMITING FUSE
COMP - COMPARTMENT
COR - CORROSION RESISTANT
CP - CONTROL PANEL
CPT - CONTROL POWER TRANSFORMER
CR - CONTROL RELAY
CT - CURRENT TRANSFORMER
DC - DIRECT CURRENT
DM - DAMPER MOTOR
DPSH - DIFFERENTIAL PRESSURE
DS - DISCONNECT SWITCH
EA - EACH
EC - ELECTRICAL CONTRACTOR
EMH - ELECTRICAL MANHOLE
EMT - ELECTRICAL METALLIC TUBING
EMTP - EMBEDDED MOTOR THERMAL PROTECTOR
ES - EMERGENCY SWITCH
ESTOP - EMERGENCY STOP
ETM - ELAPSED TIME METER
FA - FIRE ALARM
FIT - FLOW TRANSMITTER
FLEX - FLEXIBLE
FLOA - FLOAT SWITCH
FM - FORCE MAIN
FOSA - FAST-OFF-SLOW-AUTOMATIC
FOS - FAST-OFF-SLOW
FS - FLOW SWITCH
FSW - FUSED SWITCH
FVNR - FULL VOLTAGE NON REVERSING
FVR - FULL VOLTAGE REVERSING
FVTS - FULL VOLTAGE TWO SPEED
GC - GENERAL CONTRACTOR
GEN - GENERATOR
GENSET - EMERGENCY POWER GENERATOR
GFCI - GROUND FAULT CIRCUIT INTERRUPTER
GFI - GROUND FAULT INTERRUPTER
GRD - GROUND
HOA - HAND-OFF-AUTO SELECTOR SWITCH
HP - HORSE POWER
HV - HEATING AND VENTILATION
HFS - HIGH FLOAT SWITCH
IB/OB - INBOARD/OUTBOARD
IL - INDICATING LIGHT
I/0 - INPUT/OUTPUT
ISR - INTRINSICALLY SAFE RELAY
JB - JUNCTION BOX
JIC - JOINT INDUSTRIAL COUNCIL
KCMIL - THOUSAND CIRCULAR MILS
KSU - KEY SERVICE UNIT
KVA - KILOVOLT AMPERES
KW - KILOWATT
LA - LIGHTNING ARRESTOR
LC - LIGHTING CIRCUIT
LO - LOCKOUT
LS - LIMIT SWITCH
mA - MILLIAMPS
MAG - MAGNETIC
MAX - MAXIMUM

ABBREVIATIONS:

MCC - MOTOR CONTROL CENTER
MCP - MOTOR CIRCUIT PROTECTOR
MCS/ - MOLDED CASE SWITCH
T - THERMAL ONLY
M - MAGNETIC ONLY
AUTO - AUTOMATIC ONLY
MDP - MAIN DISTRIBUTION PANEL
MFR - MANUFACTURER
MIN - MINIMUM
MLO - MAIL LUGS ONLY
MMS - MANUAL MOTOR STARTER
MSS - MOTOR STARTING SWITCH
MTR - MOTOR TIMING RELAY
MWTS - MOTOR WINDING TEMPERATURE SENSOR
MWTP - MOTOR WINDING THERMAL PROTECTION
Mx - MOTOR CONTACTOR AUXILIARY CONTACT
NC - NORMALLY CLOSED
NEC - NATIONAL ELECTRIC CODE
NIMO - NIAGARA MOHAWK POWER
NO - NORMALLY OPEN
NP - NAMEPLATE
NYSEG - NEW YORK STATE ELECTRIC & GAS
OH/E - OVERHEAD ELECTRIC
OH/L - OVERHEAD TELEPHONE
OL - OVERLOAD RELAY
ϕ - PHASE
P - POLE
PB - PUSHBUTTON
PBx - PULL BOX
PF - PULLING FITTING
PLC - PROGRAMMABLE LOGIC CONTROLLER
PNL - PANEL
POT - POTENTIOMETER
PR - PAIR
PS - PRESSURE SWITCH
PT - POTENTIAL TRANSFORMER
R&R - REMOVE & REPLACE
RECP - RECEPTACLE
RGS - RIGID GALVANIZED STEEL CONDUIT
ROS - REMOTE OPERATING STATION
RV-AT - REDUCED VOLTAGE AUTO TRANSFORMER
RTU - REMOTE TERMINAL UNIT
SA - SURGE ARRESTOR
SCR - SILICON CONTROLLED RECTIFIER
SEC - SECOND
SEL or SEL SW - SELECTOR SWITCH
SHLD - SHIELDED
S/L - STOP/LOCKOUT SWITCH
SN - SOLID NEUTRAL
SS - STAINLESS STEEL
SSRVS - SOLID STATE REDUCED VOLTAGE STARTER
SSW - SAFETY SWITCH
S/S - STOP/START PUSH BUTTON
STR - STRANDED
SV - SOLENOID VALVE
SW - SWITCH
SWD - SWITCHING DUTY
SWSV - SEALWATER SOLENOID VALVE
TC - TERMINAL CABINET OR TIMED CLOSED
TDR - TIME DELAY RELAY
TERM - TERMINAL
TR - TIMER
TR.SW. - TRANSFER SWITCH
TR24 - 24-HOUR TIMER
TPR - TERTIARY PHOSPHOROUS REMOVAL
TS - TORQUE SWITCH
TSP - TWISTED SHIELDED PAIR
TST - TWISTED SHIELDED TRIAD
TYP - TYPICAL
UG/E - UNDERGROUND ELECTRIC
UG/T - UNDERGROUND TELEPHONE
UNK. - UNKNOWN
UPS - UNINTERRUPTIBLE POWER SUPPLY
VA - VOLT-AMPERES
VFD - VARIABLE FREQUENCY DRIVE
VM - VOLTMETER
VS - VOLTMETER SWITCH
VSC - VARIABLE SPEED CONTROL
VSH - VIBRATION SENSOR
W/ - WITH
WP - WEATHER PROOF, WATER PROOF
XP - EXPLOSION PROOF
2S1W - 2 SPEED, 1 WINDING
2S2W - 2 SPEED, 2 WINDING
XFMR - TRANSFORMER

GENERAL NOTES:

1. ALL WORK SHALL COMPLY WITH AND BE INSTALLED IN ACCORDANCE WITH THE SUPPLEMENTAL UNIFORM AND FIRE PREVENTION BUILDING CODE AND ALL CODES LOCAL OR OTHERWISE HAVING JURISDICTION OVER THE WORK.
2. THE WORDS PROVIDE OR INSTALL, SINGLY OR IN COMBINATION SHALL MEAN FURNISH AND INSTALL.
3. THE CONTRACTOR SHALL PROVIDE ALL CUTTING AND PATCHING AS REQUIRED FOR THE INSTALLATION OF HIS WORK.
4. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF HIS WORK AND NEWLY INSTALLED WORK. PROVIDE APPROPRIATE BARRIERS AND SAFETY GAURD RAILS AS REQUIRED.
5. THE CONTRACTOR SHALL TURN OVER TO THE OWNER AT THE COMPLETION OF ALL WORK, THREE (3) COPIES IN BOUND FORM OF OPERATING, MAINTENANCE, AND INSTRUCTION MANUALS WHICH SHALL INCLUDE ALL EQUIPMENT BROCHURES, PIPING AND WIRING DIAGRAMS, DRAWINGS, TEMPERATURE CONTROLS, AND STARTUP AND SHUTDOWN PROCEDURES OF ALL NEWLY INSTALLED EQUIPMENT.
6. THE CONTRACTOR SHALL FILE PLANS WITH GOVERNING AUTHORITIES HAVING JURISDICTION AND SHALL SECURE ALL PERMITS AND PAY ALL FEES REQUIRED FOR THE INSTALLATION OF HIS WORK.
7. THE CONTRACTOR SHALL GUARANTEE ALL MATERIAL AND WORK INSTALLED TO BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR, AFTER ACCEPTANCE OF THE INSTALLATION BY THE ENGINEER AND OWNER. THE CONTRACTOR SHALL SUBMIT IN WRITING TO OWNER STATING SAME.
8. THE CONTRACTOR SHALL INDEMNIFY THE OWNER, HIS REPRESENTATIVES AND THE ENGINEER FROM ANY CLAIMS OR SUITS RESULTING IN NEGLIGENCE ON THE PART OF THE CONTRACTOR FOR FAILING TO EXECUTE HIS WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
9. THE CONTRACTOR SHALL PROVIDE ALL RIGGING, HOISTING AND SCAFFOLDING AS REQUIRED FOR THE INSTALLATION OF HIS WORK.
10. ALL WORK SHALL BE PERFORMED BY LICENSED CONTRACTORS AND WORKMAN EXPERIENCED IN THE TRADE HAVING JURISDICTION. ALL WORK SHALL BE SUPERVISED AT ALL TIMES AND WORKMANSHIP SHALL BE FIRST CLASS IN ALL RESPECTS.
11. ANY DEVIATION OR CHANGE IN DESIGN SHALL NOT BE MADE WITHOUT WRITTEN APPROVAL OF THE ENGINEER OR OWNER. ANY WORK INSTALLED WITHOUT PRIOR APPROVAL OF THE ENGINEER OR OWNER OR FOUND TO BE DEFECTIVE OR OF POOR QUALITY SHALL BE REPLACED BY THE CONTRACTOR AT HIS OWN EXPENSE.
12. ALL CONSTRUCTION WORK SHALL BE CONFINED TO THE AREA INDICATED ON PLANS AND SHALL NOT BLOCK MEANS OF EGRESS FOR OCCUPANTS OF THE BUILDING.
13. ALL WORK SHALL BE PERFORMED DURING NORMAL WORKING HOURS: 8 A.M. TO 5 P.M. MONDAY THROUGH FRIDAY EXCEPT LEGAL HOLIDAYS OR FOR EMERGENCY REPAIRS, UNLESS DIRECTED OTHERWISE BY THE OWNER. HOWEVER, THE CONTRACTOR MAY WORK EXTRA HOURS AS NEEDED TO COMPLETE THE CONTRACT SCOPE OF WORK AND MEET THE COMPLETION DATE AT NO ADDITIONAL COST TO OWNER, AS LONG AS OWNER HAS BEEN PROPERLY NOTIFIED AND HAS APPROVED SAME.
14. PATCHING OF WALLS, FLOORS, ETC. SHALL BE BY TRADE WHO PERFORMED WORK AND SHALL MATCH EXISTING SURROUNDING AREA IN ALL RESPECTS. WORK AREA SHALL BE LEFT BROOM CLEAN AT THE END OF EACH DAY. ALL DISCARDED AND DEMOLISHED MATERIAL AND RUBBISH SHALL BE REMOVED FROM PREMISES DAILY IN A LEGAL AND APPROVED MANNER.
15. THE CONTRACTOR SHALL MAINTAIN ON THE JOB SITE A SET OF SHOP DRAWINGS IN WHICH ANY DEVIATIONS FROM THE ORIGINAL DESIGN SHALL BE NOTED. UPON COMPLETION OF THE INSTALLATION OF NEW WORK THE CONTRACTOR SHALL TURN OVER TO THE OWNER AND ENGINEER (1) SET OF AS-BUILT REPRODUCIBLE DRAWINGS AND (1) SET OF PRINTS INCLUDING ALL APPROVED FIELD CHANGES AND DESIGN DEVIATIONS PRIOR TO RECEIPT OF FINAL PAYMENT BY OWNER.
16. ALL WORK SHOWN ON ALL DRAWINGS IS TO BE PROVIDED UNLESS OTHERWISE NOTED.
17. ALL PENETRATIONS THROUGH PARTITIONS, FLOORS, WALLS AND ROOF FOR ALL CONDUIT SHALL BE SEALED AND FIRE SAFED OFF TO MAINTAIN FIRE INTEGRITY OF EXISTING STRUCTURE.
18. BEFORE COMMENCING HIS WORK, THE ELECTRICAL CONTRACTOR SHALL VISIT THE PREMISES AND NOTIFY THE OWNER AND ARCHITECT OF ANY EXISTING CONDITIONS THAT WILL INTERFERE WITH HIS WORK.
19. ALL DOWNSTREAM DEVICES WHICH BECOME DISCONNECTED DURING THIS CONSTRUCTIONS SHALL BE RECONNECTED AT NO COST TO THE OWNER. PROVIDE ALL CONDUIT AND WIRE AS REQUIRED.
20. CONTRACTOR SHALL COORDINATE ANY SHUTDOWNS WITH THE CLIENT, MINIMUM OF 2 WEEKS NOTICE. CONTRACTOR SHALL INCLUDE IN HIS LUMP SUM BID THE COST OF ANY PREMIUM TIME, OVER TIME, ETC. NO ADDITIONAL PAYMENT WILL BE GRANTED FOR THIS WORK.
21. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK, AS WELL AS BE SOLELY RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF THE WORK.
22. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING REASONABLE PRECAUTIONS AND SHALL PROVIDE REASONABLE PROTECTION TO PREVENT INJURY OR DAMAGE TO PERSONS, THE WORK AND OTHER PROPERTY.
23. ALL WORK SHALL BE INSPECTED BY A THIRD PARTY AGENCY ACCEPTABLE TO THE AUTHORITY HAVING JURISDICTION.

LEGEND

SYMBOL	DESCRIPTION
(solid line)	EXISTING EQUIPMENT, DEVICE, CONDUIT, ETC.
(dashed line)	EXISTING EQUIPMENT, DEVICE, CONDUIT, ETC. TO BE REMOVED
(bold line)	EQUIPMENT, DEVICE, CONDUIT, ETC. TO BE FURNISHED AND PROVIDED
30A/3P	CIRCUIT BREAKER, AMPS/POLES
(M)	METER
	CURRENT TRANSFORMER
	PANELBOARD
(J) [J]	JUNCTION BOX
ATS	AUTOMATIC TRANSFER SWITCH
30/-	DISCONNECT SWITCH - FRAME/FUSE
	CIRCUIT HOMERUN (120V) TO PANELBOARD
	WIREWAY - CROSSLINES INDICATE NUMBER OF CONDUCTORS WHERE MORE THAN TWO
OH, UG	OVERHEAD, UNDERGROUND

NOTE: ALL WORK IS TO BE PROVIDED UNLESS OTHERWISE NOTED.

CLIENT / SUBCONSULTANT:

EDR
a better environment
Environmental Design & Research,
Landscape Architecture, Engineering & Environmental Services, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
P. 315.471.0688

PROJECT TITLE: **RFP 2023-02 - INSTALLATION OF A NEW 60KW GENERATOR**

PROJECT LOCATION: **WEST NYACK TRANSFER STATION, WEST NYACK, NEW YORK**

CLIENT: **ROCKLAND GREEN**

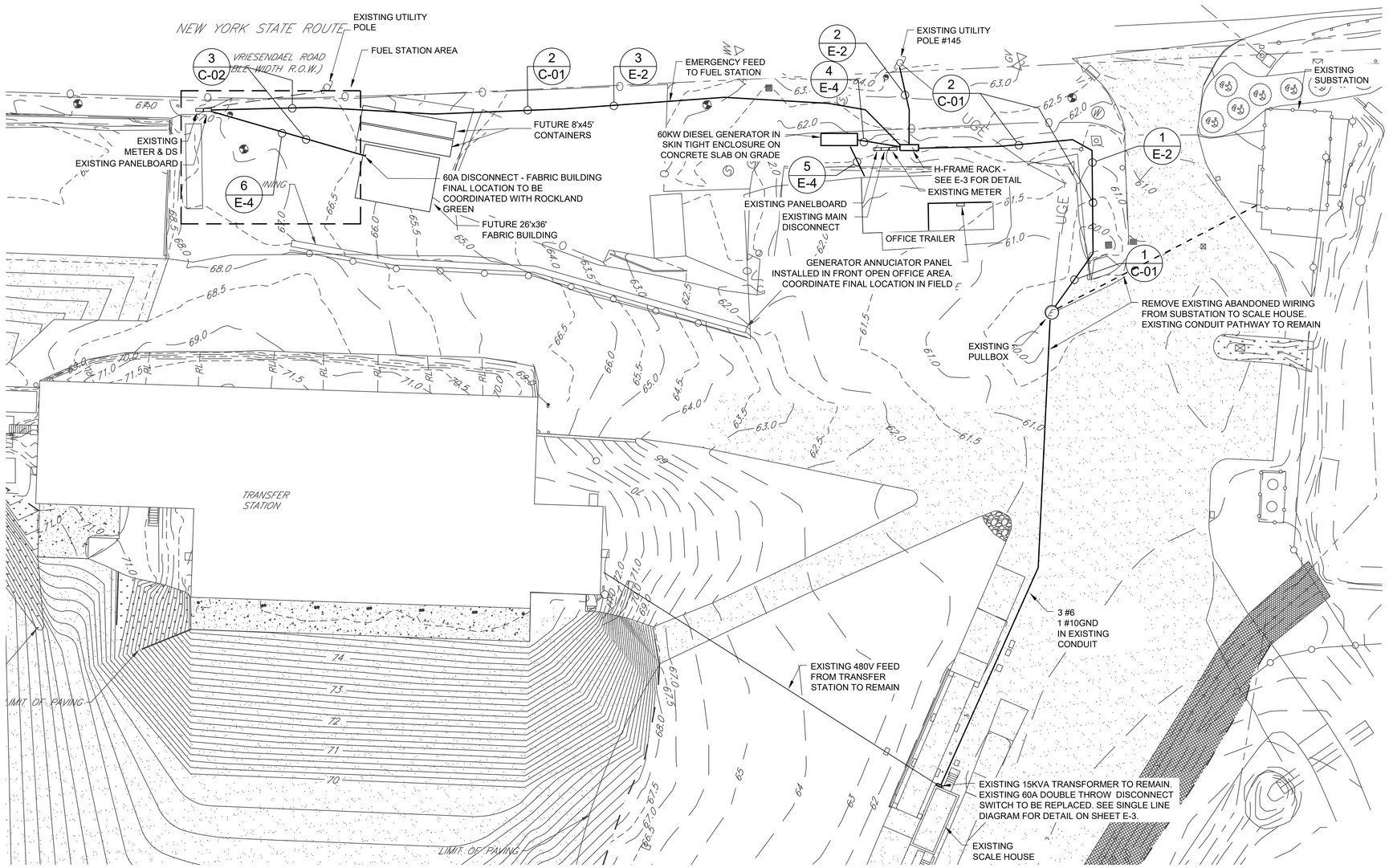
DRAWING TITLE: **GENERAL NOTES, ABBREVIATIONS AND, LEGENDS**

DRAWINGS ISSUED FOR / REVISIONS

NO.	DATE	ISSUED FOR / REVISION	BY	CHK	APP
1					
2					
3					
4					
5					
6					

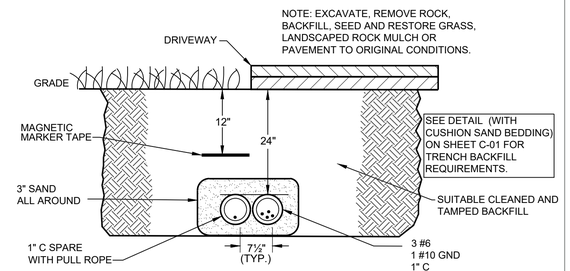
EDR JOB#: **20098**
DATE: **04/2023**
SCALE: **AS NOTED**
DRAWN BY: **AMG**
CHECKED BY: **JGD**
DRAWING NUMBER:

E-1



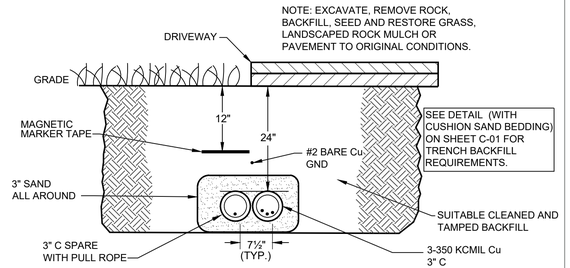
SITE PLAN

SCALE: 1" = 30'



1 E-2 TRENCH DETAIL

NO SCALE



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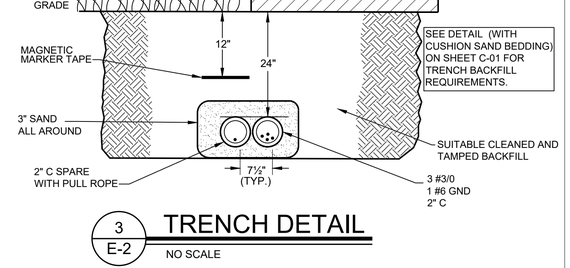


3 E-2 TRENCH DETAIL

NO SCALE

CONTRACTOR TO HIRE SERVICES OF OUTSIDE AGENCY FOR MARKING OUT ALL UNDERGROUND UTILITIES. MARK OUT UNDER AND 6'-0" BOTH SIDES OF EXCAVATION AREA AND ENTIRE LENGTH. CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGED UTILITIES AND COST FOR THE REPAIRS.

CLIENT / SUBCONSULTANT:

STATE OF NEW YORK · DANNY R. LYNCH · 55626 · LICENSED PROFESSIONAL ENGINEER

EDR a better environment
Environmental Design & Research,
Landscape Architecture, Engineering & Environmental Services, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
P. 315.471.0688

PROJECT TITLE: **RFP 2023-02 - INSTALLATION OF A NEW 60KW GENERATOR**

PROJECT LOCATION: **WEST NYACK TRANSFER STATION, WEST NYACK, NEW YORK**

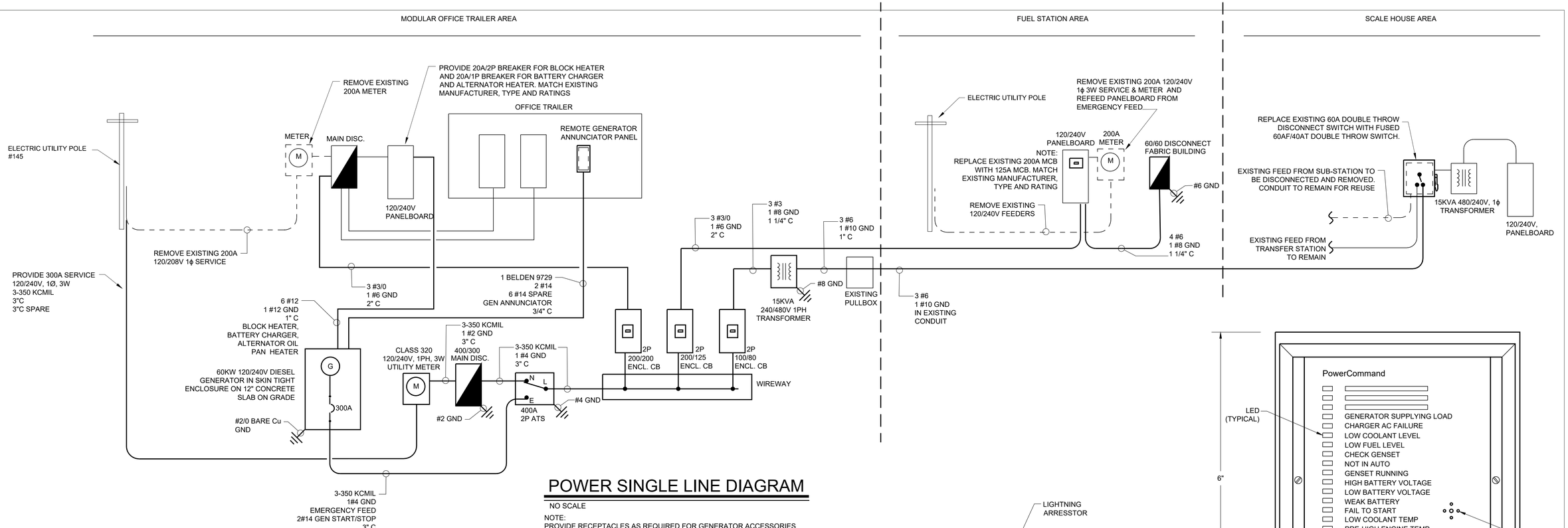
CLIENT: **ROCKLAND GREEN**

DRAWING TITLE: **SITE PLAN**

DRAWINGS ISSUED FOR / REVISIONS

NO.	DATE	ISSUED FOR / REVISION	BY	CHK	APP
1					
2					
3					
4					
5					
6					

EDR JOB#: **20098**
DATE: **04/2023**
SCALE: **AS NOTED**
DRAWN BY: **AMG**
CHECKED BY: **JGD**
DRAWING NUMBER: **E-2**

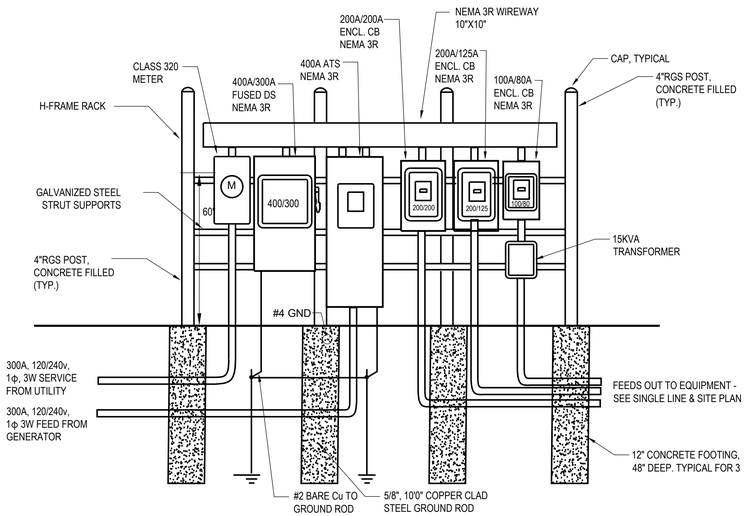


POWER SINGLE LINE DIAGRAM

NO SCALE

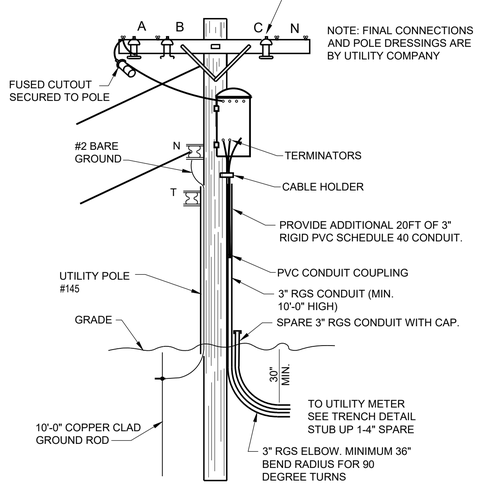
NOTE:
PROVIDE RECEPTACLES AS REQUIRED FOR GENERATOR ACCESSORIES WITHIN GENERATOR ENCLOSURE.

ATS NOTES:
1. ATS IS OPEN TRANSITION "BREAK-BEFORE-MAKE" TYPE.
2. ATS IS 400A, AS MANUFACTURED BY ASCO, 4000 SERIES, MODEL 4ATS.



H-FRAME EQUIPMENT RACK ELEVATION

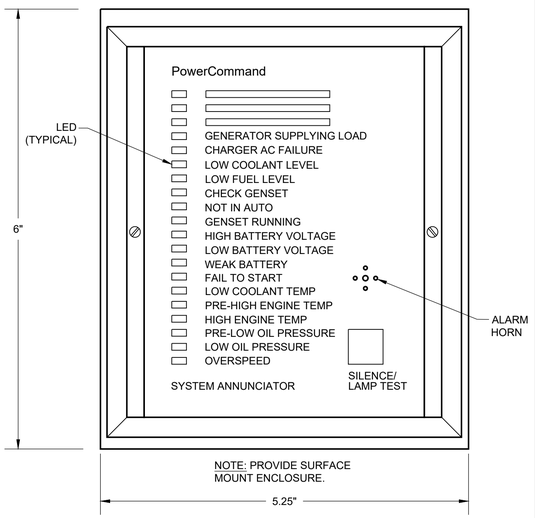
SCALE: 3/8" = 1'-0"



EXISTING UTILITY POLE DETAIL

NO SCALE

NOTE:
THIS DETAIL SHOWN FOR INFORMATION AND COORDINATION PURPOSES. ALL EQUIPMENT ASSOCIATED WITH UTILITY POLES TO BE INSTALLED BY CONTRACTOR AS PER UTILITY COMPANY REQUIREMENTS. CONTRACTOR TO PROVIDE AND INSTALL 4" RIGID PVC ELBOW AND 4" RIGID PVC CONDUIT (SCHEDULE 80). MINIMUM OF 10'-0" OF 4" PVC CONDUIT (ABOVE GRADE) SHALL BE INSTALLED BY CONTRACTOR WITH AN ADDITIONAL 20' TO BE PROVIDED FOR FINAL CONNECTION - UTILITY COMPANY TO MAKE ALL FINAL CONNECTIONS. CONTRACTOR TO PROVIDE AND INSTALL ENOUGH CABLE TO REACH FROM THE TOP OF UTILITY POLE TO THE UTILITY METER PLUS AN EXTRA 15'-0" AT THE UTILITY METER.



GENERATOR ANNUCIATOR PANEL DETAIL

NO SCALE

CLIENT / SUBCONSULTANT:

STATE OF NEW YORK · BARRY A. LYNCH · 55626 · LICENSED PROFESSIONAL ENGINEER

EDR
a better environment
Environmental Design & Research,
Landscape Architecture, Engineering & Environmental Services, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
P. 315.471.0688

PROJECT TITLE: **RFP 2023-02 - INSTALLATION OF A NEW 60KW GENERATOR**

PROJECT LOCATION: **WEST NYACK TRANSFER STATION, WEST NYACK, NEW YORK**

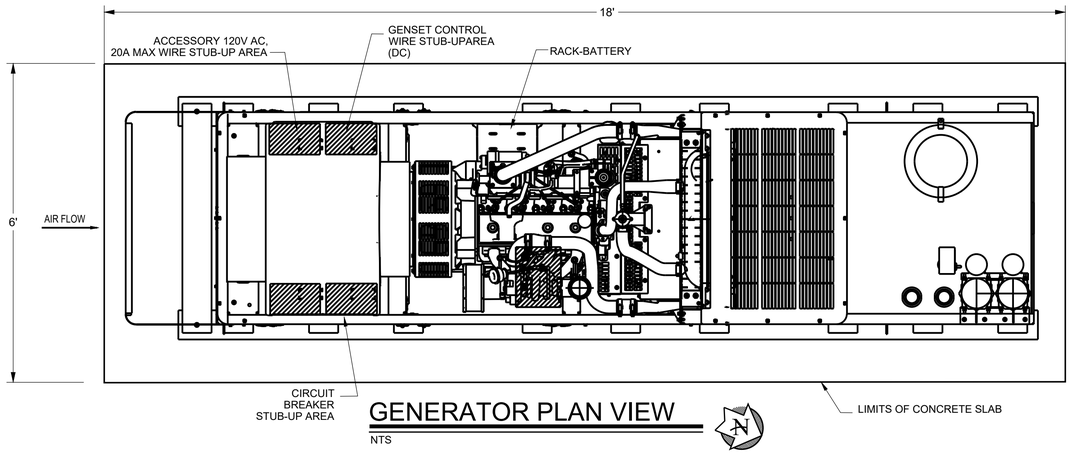
CLIENT: **ROCKLAND GREEN**

DRAWING TITLE: **ELECTRICAL DETAILS & SINGLE LINE DIAGRAM**

DRAWINGS ISSUED FOR / REVISIONS

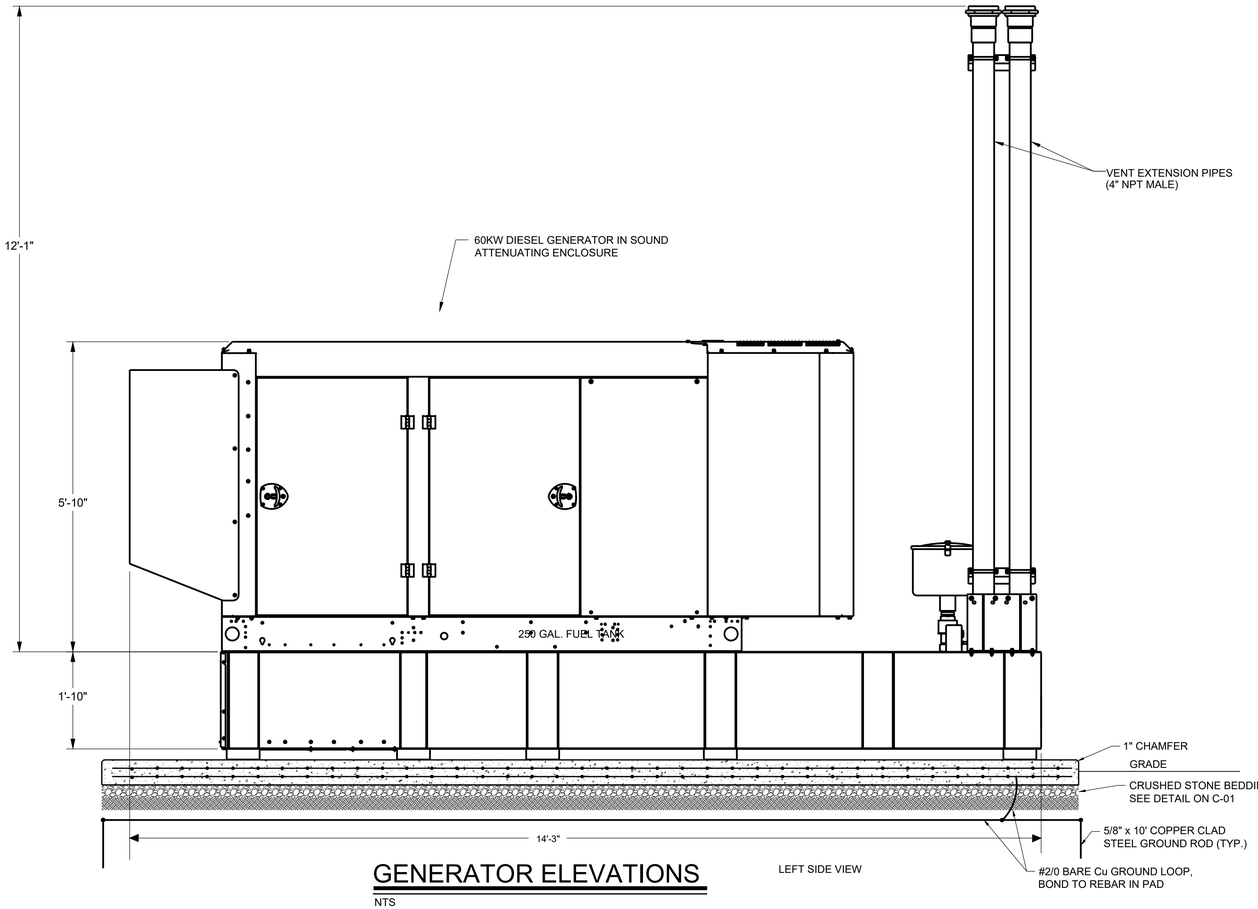
NO.	DATE	ISSUED FOR / REVISION	BY	CHK	APP
1					
2					
3					
4					
5					
6					

EDR JOB#: **20098**
DATE: **04/2023**
SCALE: **AS NOTED**
DRAWN BY: **AMG**
CHECKED BY: **JGD**
DRAWING NUMBER: **E-3**



GENERATOR PLAN VIEW

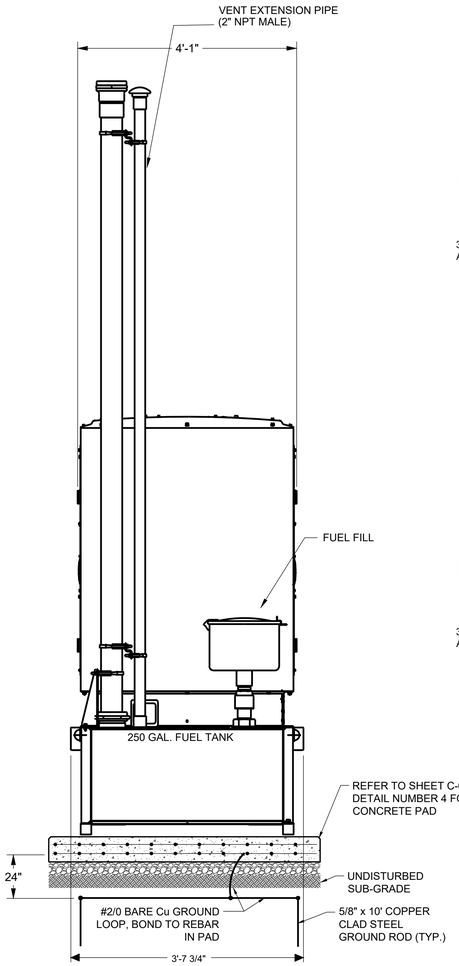
NTS

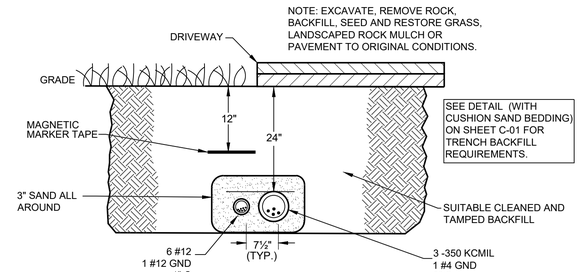


GENERATOR ELEVATIONS

NTS

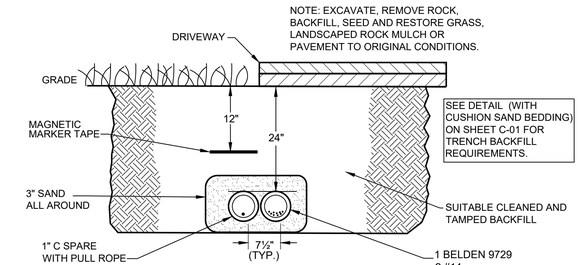
LEFT SIDE VIEW





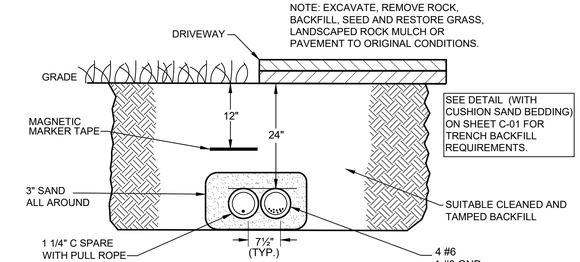
4 / E-1 TRENCH DETAIL

NO SCALE



5 / E-1 TRENCH DETAIL

NO SCALE



6 / E-1 TRENCH DETAIL

NO SCALE

CLIENT / SUBCONSULTANT:

STATE OF NEW YORK · HENRY R. LYNCH · 55626 · LICENSED PROFESSIONAL ENGINEER

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Landscape Architecture, Engineering & Environmental Services, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
P. 315.471.0688

PROJECT TITLE: **RFP 2023-02 - INSTALLATION OF A NEW 60KW GENERATOR**

PROJECT LOCATION: **WEST NYACK TRANSFER STATION, WEST NYACK, NEW YORK**

CLIENT: **ROCKLAND GREEN**

DRAWING TITLE: **GENERATOR AND TRENCH DETAILS**

DRAWINGS ISSUED FOR / REVISIONS

NO.	DATE	ISSUED FOR / REVISION	BY	CHK	APP
1					
2					
3					
4					
5					
6					

EDR JOB#: **20098**

DATE: **04/2023**

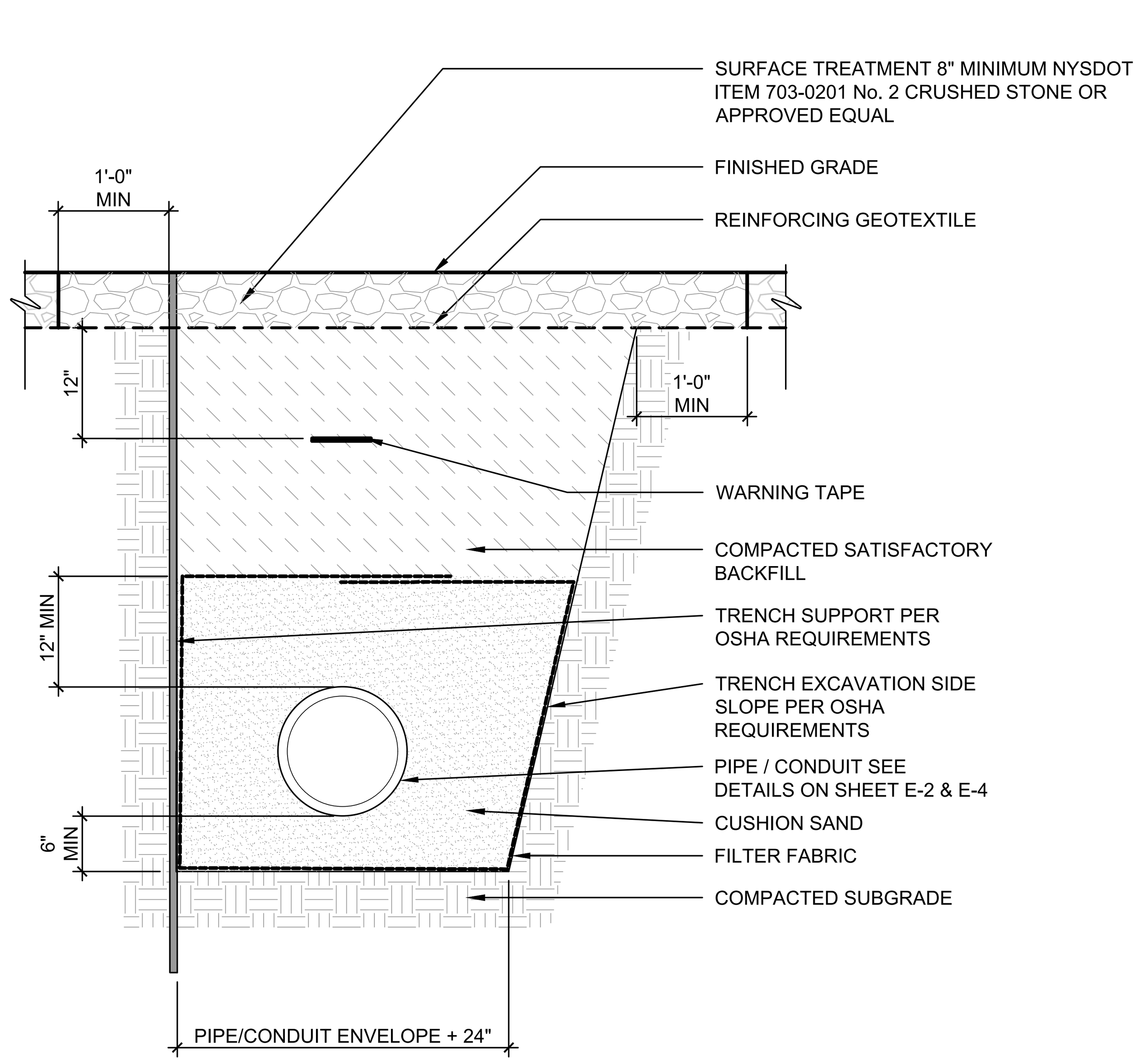
SCALE: **AS NOTED**

DRAWN BY: **AMG**

CHECKED BY: **JGD**

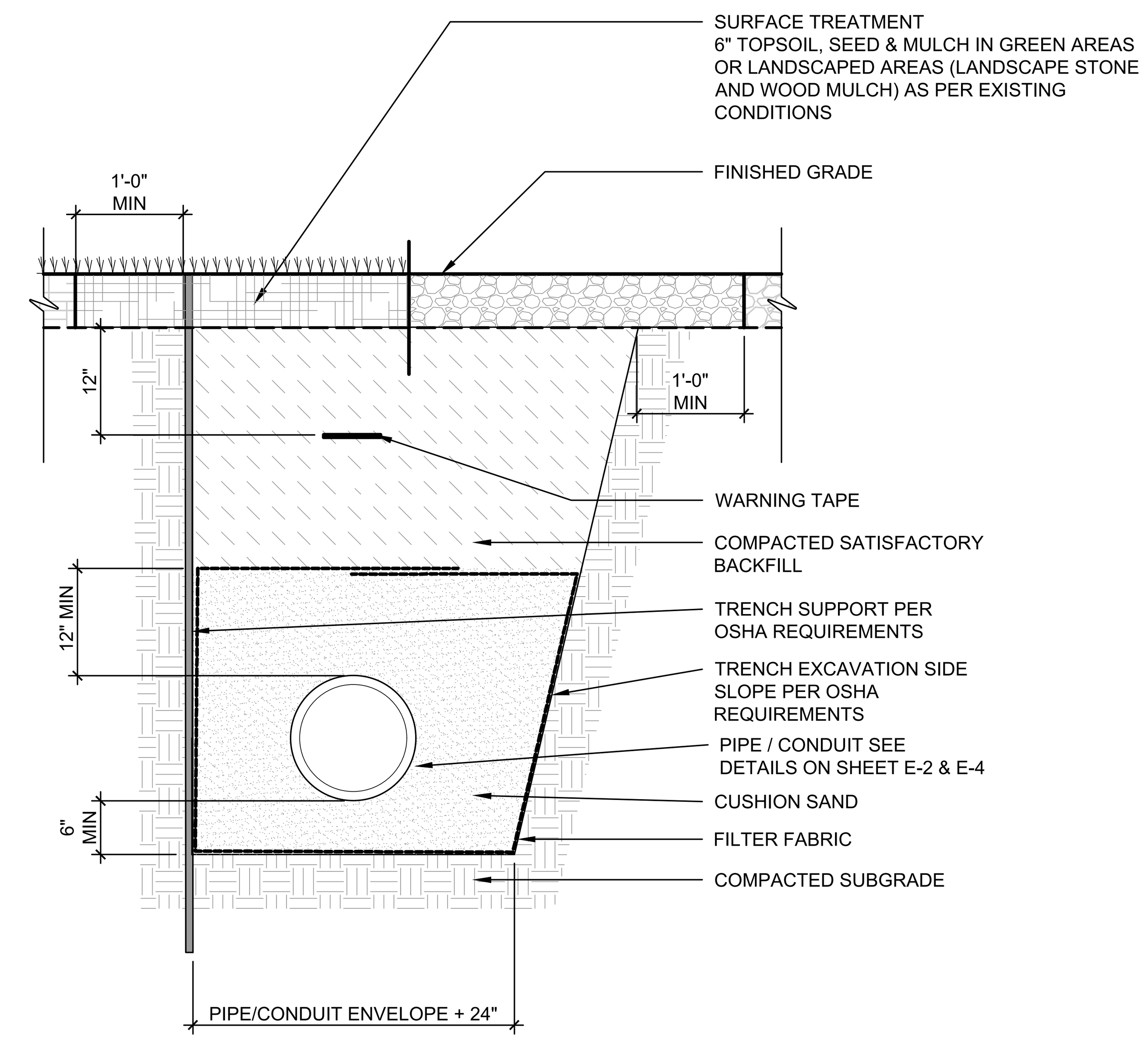
DRAWING NUMBER:

E-4



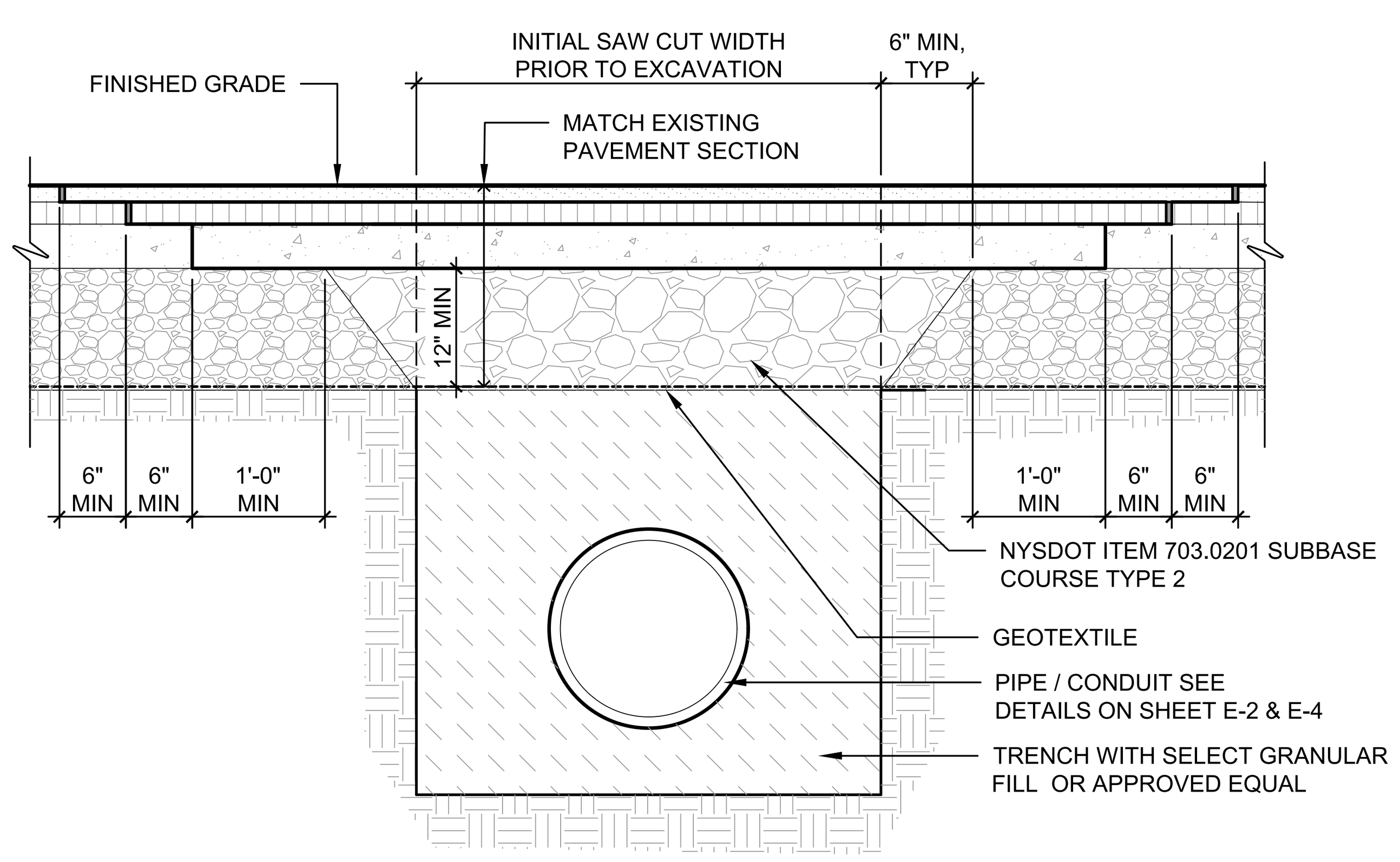
3 PIPE TRENCH IN GRAVEL DRIVE

Scale: NTS — WITH CUSHION SAND BEDDING



2 PIPE TRENCH

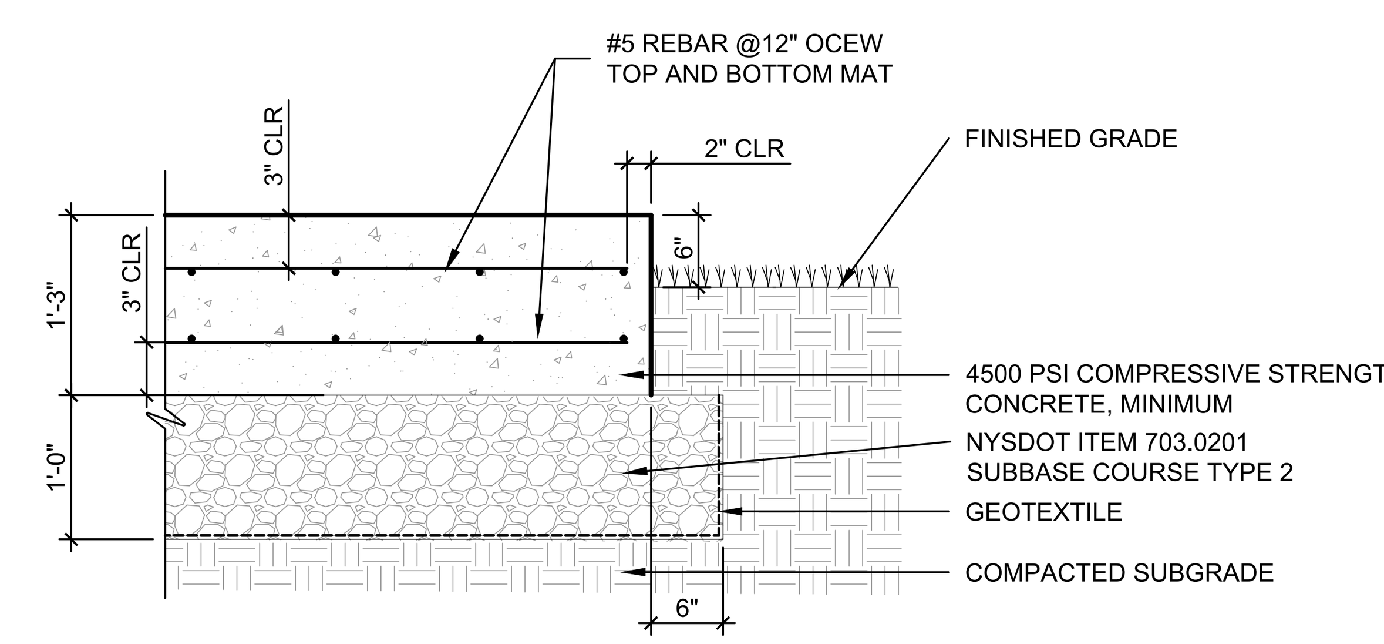
Scale: NTS — WITH CUSHION SAND BEDDING



NOTES:
1. EXISTING PAVEMENT SHALL BE SAW CUT TO OBTAIN A STRAIGHT AND NEAT EDGE FOR PAVING. SAW CUT SHALL BE MADE PRIOR TO PAVING AFTER BACKFILL OF TRENCH TO BOTTOM OF NEW PAVEMENT.
2. ALL SEAMS BETWEEN EXISTING AND NEW ASPHALT SURFACES SHALL BE SEALED WITH ASPHALT FILLER.
3. BOTTOM OF ASPHALT OR CONCRETE COURSE SHALL MATCH THE BOTTOM OF OR BE SET BELOW BOTTOM OF EXISTING PAVEMENT BOTTOM COURSE.
4. AS BUILT INFORMATION INDICATES THAT THE EXISTING ASPHALT SECTION CONSISTS OF THE FOLLOWING:
   - 2" ASPHALT CONCRETE TOP COURSE. TYPE 6F3 NYSDOT ITEM NO. 403.178302
   - 2 - 2" LAYER ASPHALT CONCRETE BINDER COURSE, TYPE 3 NYSDOT ITEM NO. 403.138902

1 ASPHALT - TRENCH RESTORATION

Scale: NTS



4 GENERATOR PAD DETAIL - REINFORCED CONCRETE

Scale: NTS

GENERATOR PAD NOTES:

1. COORDINATE PAD SIZE WITH DIMENSIONS SHOWN ON DRAWING E-04.
2. COORDINATE STUB UP LOCATIONS WITH APPROVED GENERATOR MANUFACTURERS SHOP DRAWINGS
3. CONTRACTOR SHALL FURNISH AND INSTALL TEN (10) ANCHORS FOR THE OWNER PROVIDED GENERATOR. ANCHORS SHALL BE A STAINLESS STEEL $\frac{1}{2}$" DIAMETER HILTI KWIK BOLT 3 WITH 3 $\frac{1}{2}$" MINIMUM EMBED DEPTH. ANCHORS SHALL MAINTAIN A MINIMUM OF 10-INCHES EDGE DISTANCE FROM ALL CONCRETE EDGES.

CLIENT / SUBCONSULTANT:

EDR
a better environment
Environmental Design & Research,
Landscape Architecture, Engineering & Environmental Services, D.P.C.
217 Montgomery Street, Suite 1100
Syracuse, New York 13202
P. 315.471.0688

PROJECT TITLE: **RFP 2023-02 - INSTALLATION OF A NEW 60KW GENERATOR**

PROJECT LOCATION: **WEST NYACK TRANSFER STATION, WEST NYACK, NEW YORK**

CLIENT: **ROCKLAND GREEN**

DRAWING TITLE: **TRENCH DETAILS AND GENERATOR PAD DETIALS**

DRAWINGS ISSUED FOR / REVISIONS

NO.	DATE	ISSUED FOR / REVISION	BY	CHK	APP
1					
2					
3					
4					
5					
6					

EDR JOB#: **20098**
DATE: **04/2023**
SCALE: **AS NOTED**
DRAWN BY: **JTW**
CHECKED BY: **JHH**
DRAWING NUMBER: **C-01**

Date Printed: 4/13/2023 3:10:40 PM
J:\20098 Rockland Green\Cad\Working Drawings\West Nyack\Generator\Genset Drawings.dwg
ORIGINAL DRAWING SIZE: ANSI D (22" X 34")

APPENDIX F

CUMMINS GENERATOR AND ATS DESCRIPTION (PRE-PURCHASED BY ROCKLAND GREEN)

Sales and Service

Rockland Green - Clarkstown Transfer Station

1.0 - SUBMITTAL FOR APPROVAL

Transmittal

Name: Rockland Green

Address: 172 Main Street

City: Nanuet

State: NY **Zip Code:** 10954

Phone:

Date: Jul 27, 2022

Attention: Dee Louis **Email:** dlouis@rocklandgreen.com

SENDING THE FOLLOWING PAGE(S) ATTACHED: 112

PROJECT SUBMITTAL: ◉ PROJECT SCHEDULE: ○ SAMPLES: ○

DOCUMENT ORIGINALS: ○

CORRESPONDENCE: ○ ADDITIONAL INFO.: ○ OTHER: ○

SENDING VIA: FAX: ○ HAND DELIVERY: ○ MAIL: ○

OVERNIGHT: ○ E-MAIL: ◉

COPIES	DATED	DESCRIPTION
1	Jul 27, 2022	GENERATOR & ATS SUBMITTALS – ONE ELECTRONIC FILE

TRANSMITTED BY: Mark Woodward **DIRECT: (339)216-8909**

COMMENTS: **Please do not hesitate to query.**

Sales and Service

Rockland Green - Clarkstown Transfer Station

1.0 - SUBMITTAL FOR APPROVAL

Submittal Approvals

Date: Jul 27, 2022

Approval Actions:

Please send approval actions C/O:

Mark Woodward - Project Manager

Email: mark.n.woodward@cummins.com / Direct Line: 339-216-8909

Cummins Sales and Service - East Region

LynStaar Engineering, P.C.

LYNSTAAR ENGINEERING, P.C.

- ☐ **APPROVED**
- ☑ **APPROVED AS CORRECTED**
- ☐ **REVISE AND RESUBMIT**
- ☐ **NOT ACCEPTED**
- ☐ **FOR INFORMATION ONLY**

Checking is only for conformance with the design intent of the project and compliance with the information given in the contract documents. Contractor is responsible for dimensions, correct information indicated, coordination of the work with all trades and all other requirements of the contract documents. This shop drawing is the product and the property of the contractor and is not a part of the contract documents.

BY jdulak **DATE** 8/2/2022

1. Generator approved as submitted.
2. Provide accessory C207, lockable cover for external accessible ATS controls.

Cummins Sales and Service

SUBMITTAL
POWER GENERATION EQUIPMENT

PROJECT NAME: Rockland Green - Clarkstown Transfer Station

PROJECT: Cummins Proj# TBD

MODEL(s): C60 D6C (60kW) w/ 400A ATS

CUSTOMER: Rockland Green
REFERENCE PO #: 6203

SUPPLIER: Cummins Sales and Service

DATE: 7/27/22

SALES REPRESENTATIVE: Ed Cheung
718-502-1217
ed.cheung@cummins.com

PROJECT MANAGER:

Mark Woodward
339-216-8909
mark.n.woodward@cummins.com

Serving Cummins Customers
in the
East Region

NOTICE

THIS SUBMITTAL IS BASED UPON OUR INTERPRETATION OF THE PROJECT REQUIREMENTS AND/OR SPECIFICATIONS AND IS IN ACCORDANCE WITH YOUR ORDER AND PRODUCT AVAILABILITY. PLEASE REVIEW THE ENCLOSED DATA COMPLETELY AND CAREFULLY. SHOULD ADDITIONAL INFORMATION OR CLARIFICATION BE REQUIRED, PLEASE FORWARD A SUBMITTAL COPY, COMPLETE WITH YOUR NOTATIONS, TO OUR OFFICE WITHIN THIRTY (30) DAYS FOR A PROMPT RESPONSE AND/OR RESUBMITTAL.

CONSIDERABLE ATTENTION IS GIVEN TO THE PREPARATION OF THIS SUBMITTAL TO ENSURE IT IS COMPLETE, CONCISE AND CORRECT AS

For questions or comments regarding this submittal, please contact your Cummins Sales Representative listed on the Cover Page.

To inquire about factory ship dates, arranging delivery and to schedule start-up of your Cummins Power Generation equipment, please contact the Project Manager listed on the Cover Page of this submittal.

**** Start-Ups must be Scheduled 2 Weeks in Advance ****

Sales and Service

Rockland Green - Clarkstown Transfer Station

1.0 - SUBMITTAL FOR APPROVAL

Submittal

Bill of Materials:

Date: **Jul 27, 2022**

Project Description:	Cummins Sales and Service is pleased to present the following submittal for the above referenced project Facility Electrical Power Generation Equipment consisting of the following:
Generator Model:	C60 D6C
Fuel Type / Fuel System:	Diesel
kW Rating:	60kW
Phase:	(1) Single Phase;
Voltage:	120/240;
Power Factor:	1.0 PF;
Power Ratings:	(ESP) Emergency Standby Power
Charging System:	12 volt, Negative Ground Electrical Starting System.
Certifications and Listings:	The generator set is listed: - UL 2200, Stationary Engine Generator Assemblies. - IBC
Engine Data:	Model: Cummins Inc. QSB5-G13 Type: 4 Cycle, In-line, 4 Cylinder Diesel Displacement: 272 cu. In. (4.5 liters) Bore: 4.21 in. (107.0 mm), Stroke: 4.88 in. (124 mm) Compression Ratio: 17.3:1 Aspiration: Turbocharged and charge air-cooled Emission Control Device: Turbocharged and charge air-cooled
Cooling System:	Standard Set Mounted Radiator Cooling System with the following features / options: - Shutdown on Low Coolant Level option.

Sales and Service

Radiator Ambient Temperature:	50 Degree C, High Ambient Radiator Provided
Alternator:	Cummins revolving field, 4 pole, brushless design. Dynamically balanced rotor permanently aligned to engine by flexible disc coupling. Class H insulation throughout. Alternator specifics include: - 12 Lead - Double Delta - 105 Degree (C) Rise - ads-207 UC3D Alternator - Low Voltage - (1) 120 volt, 100W Alternator Heater Provided.
Excitation:	Cummins PMG (Permanent Magnet Generator) excitation provided.
Bearing:	Heavy duty, prelubricated cartridge bearing.
Voltage Regulator:	Cummins PMG provides torque matched operation for improved motor starting and reduces engine stalling in overload situation.
Governor:	Electronic Isochronous frequency regulation - Random frequency variation +/- 0.5% - Voltage Regulation, no load to full load +/- 1.0%
Engine Control Panel:	Power Command Control PC 2.3: Cummins' microprocessor based control system with: AmpSentry™ Protective Relay - UL Listed true alternator over current protection. See specification sheet for more detail.
Instrumentation, Controls, and Relays:	See specification sheet for details.
Charging System:	12 volt, negative ground electrical starting system:

Sales and Service

Sub Base Fuel Tank:	UL 142 compliant, double wall, sub-base fuel tank with the following features / options: - 250 Gallon Tank Size - 39 Hour Run Time at Full Load - Rupture Basin Switch - Low Fuel Level Switch - High Fuel Level Switch - Fuel Gauge - OFPV - 5 Gal. Spill Fill - Vent Extensions
Generator Enclosure:	Cummins generator enclosure with the following features / options: - Weather Protective Enclosure - Aluminum Construction - Sound Attenuated Level 2 - 70.5 Sound Pressure Levels @ 7 meters dB(A) - Maintenance Doors Mounted Both Sides & Rear - Lockable doors using key or padlock - Color: Green, - Fixed Louver Openings - Internally Mounted Critical Exhaust - Wind Rating 180 m.p.h.
Structural Sub Base:	Provided for mounting of engine and generator - with Coolant Drain and Oil Drain Extensions.
Exhaust System:	Provided: - Critical Type exhaust
Battery:	12 volt lead acid type, with welded battery rack, cables.
Battery Charger:	Float type, 6 amp, 12 volt D.C. output
Circuit Breakers and Accessories:	- Breaker # A - Molded case type, mounted in enclosure and wired to generator, (1) 125-400A, LSI Adjustable Trip, 3 pole, UL 600V, 100% rated, unit mounted: Right Side of Alternator.
Coolant Heater:	1500 / 2000 Watt, 208 / 240 Volt, Single Phase Thermostatically Controlled Coolant Heater Temperature Rated for below 40 Degrees F Ambient
GenSet Options, Accessories and Miscellaneous	Annunciator: - Cummins 20 light, Annunciator provided. See specification sheet for details.

Sales and Service

Items:	Vibration Isolators: - Integral Isolation provided. Other Options / and Accessories: - Larger Battery Rack - Oil Heater - Control Meters - Control E-Stop - Aux. Contacts in Control - Fuel Water Separator - Oil Pressure Gauge
Lube, Oil, and Antifreeze:	Provided.
Operations and Maintenance Manual:	One Provided. Additional copies per project specifications (If Applicable)
GenSet Warranty:	Standby 5 year / 2,500 hours, Parts, Labor, Travel
Automatic Transfer Switching:	(1) Cummins Model OTECC, 400 amp, Automatic Transfer Switch with all standard accessories including the following: - 3 pole - Application – Utility to Genset - UL 1008/CSA Certification - 60 Hz, - (1) Phase, - 240 Volt - NEMA Type 3R Enclosure - Auxiliary Relay-Switch In Emergency Position-12 VDC - Communications Module - Standard Time Delays
Transfer Switch Warranty:	5 Year Comprehensive Extended Warranty

Sales and Service

Start Up and Testing:	Provided by Cummins Trained Technicians:
	
	- Factory Testing:
	  - Safety Shutdowns
	
	- On-Site Testing:
	  - Startup
	  - 4hr Load Bank

Planned Maintenance:	A 2 Year Maintenance contract is included with 1 Inspection and 1 Full service per year.

Specification Sheet

Diesel Generator Set

QSB5 Series Engine
50-125 kW Standby
EPA Tier 3 Emissions

Description

Cummins® generator sets are fully integrated power generation systems providing optimum performance, reliability and versatility for stationary Standby applications.

Features

Heavy duty engine - Rugged 4-cycle industrial diesel delivers reliable power and fast response to load changes.

Alternator - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings, low waveform distortion with non-linear loads and fault clearing short-circuit capability.

Control system - The PowerCommand® 1.1 electronic control is standard equipment and provides total generator set system integration including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, output metering, auto-shutdown at fault detection and NFPA 110 Level 1 compliance. The PowerCommand 2.3 control is also optional and is UL 508 Listed and provides AmpSentry™ protection.

Cooling system - Standard cooling package provides reliable running at up to 50 ℃ (122 ℉) ambient temperature.

Enclosures - The aesthetically appealing enclosure incorporates special designs that deliver one of the quietest generators of its kind. Aluminium material plus durable powder coat paint provides the best anti-corrosion performance. The generator set enclosure has been evaluated to withstand 180 MPH wind loads in accordance with ASCE7 -10. The design has hinged doors to provide easy access for service and maintenance.

Fuel tanks - Dual wall sub-base fuel tanks are offered as optional features, providing economical and flexible solutions to meet extensive code requirements on diesel fuel tanks.

NFPA - The generator set accepts full rated load in a single step in accordance with NFPA 110 for Level 1 systems.

Warranty and service - Backed by a comprehensive warranty and worldwide distributor network.

	Standby 60 Hz		Prime 60 Hz		
Model	**kW**	**kVA**	**kW**	**kVA**	**Data sheets**
~~C50D6C~~	~~50~~	~~63~~	45	56	NAD-6333-EN
C60D6C	60	75	54	68	NAD-6334-EN
~~C80D6C~~	~~80~~	~~100~~	72	90	NAD-6335-EN
C100D6C	100	125	90	113	NAD-6336-EN
C125D6C	125	156	112.5	141	NAD-6216-EN

Generator Set Specifications

Governor regulation class	ISO8528 Part 1 Class G3
Voltage regulation, no load to full load	± 1.0%
Random voltage variation	± 1.0%
Frequency regulation	Isochronous
Random frequency variation	± 0.50%
Radio frequency emissions compliance	FCC code title 47 part 15 class A and B

Engine Specifications

Design	Turbocharged and charge air cooled
Bore	107 mm (4.21 in.)
Stroke	124 mm (4.88 in.)
Displacement	4.5 L (272 in^3)
Cylinder block	Cast iron, in-line 4 cylinder
Battery capacity	850 amps per battery at ambient temperature of 0 ℃ (32 ℉)
Battery charging alternator	100 amps
Starting voltage	2 x 12 volt in parallel, negative ground
Lube oil filter type(s)	Spin-on with relief valve
Standard cooling system	High ambient radiator
Rated speed	1800 rpm

Alternator Specifications

Design	Brushless, 4 pole, drip proof, revolving field
Stator	2/3 pitch
Rotor	Direct coupled, flexible disc
Insulation system	Class H per NEMA MG1-1.65
Standard temperature rise	120 ºC (248 ℉) Standby
Exciter type	Torque match (shunt) with PMG as option
Alternator cooling	Direct drive centrifugal blower
AC waveform Total Harmonic Distortion (THDV)	< 5% no load to full linear load, < 3% for any single harmonic
Telephone Influence Factor (TIF)	< 50 per NEMA MG1-22.43
Telephone Harmonic Factor (THF)	< 3%

Available Voltages

1-phase	3-phase				
• 120/240	• 120/208	• 120/240	• 277/480	• 347/600	• 127/220

Generator Set Options

Fuel system

- Basic fuel tanks
- Regional fuel tanks

Engine

- Engine air cleaner – normal or heavy duty
- Shut down – low oil pressure
- Extension – oil drain
- Engine oil heater

Alternator

- 120 ℃ temperature rise alternator
- 105 ℃ temperature rise alternator
- PMG excitation
- Alternator heater, 120 V
- Reconnectable full 1 phase output alternator

Control

- AC output analog meters
- Stop switch – emergency
- Auxiliary output relays (2)
- Auxiliary configurable signal inputs (8) and relay outputs (8)

Electrical

- One, two or three circuit breaker configurations
- 80% rated circuit breakers
- 80% or 100% rated LSI circuit breakers
- Battery charger

Enclosure

- Sound Level 1 or Level 2 enclosure, sandstone or green color
- Weather protective enclosure with muffler installed, green color
- Winter protective enclosure, green color

Cooling system

- Shutdown – low coolant level
- Warning – low coolant level
- Extension – coolant drain
- Coolant heater options:
  - <4 ℃ (40 ℉) – cold weather
  - <-18 ℃ (0 ℉) – extreme cold

Exhaust system

- Exhaust connector NPT
- Exhaust muffler mounted

Generator set application

- Base barrier – elevated genset
- Radiator outlet duct adapter

Warranty

- Base warranty – 2 year/1000 hours, Standby
- Base warranty – 1 year/unlimited hours, Prime
- 3 year Standby warranty options
- 5 year Standby warranty options

Generator Set Accessories

- Coolant heater
- Battery heater kit
- Engine oil heater
- Remote control displays
- Auxiliary output relays (2)
- Auxiliary configurable signal inputs (8) and relay outputs (8)
- Annunciator – RS485
- Audible alarm
- Remote monitoring device – PowerCommand 500/550
- Battery charger – stand-alone, 12 V
- Circuit breakers
- Enclosure Sound Level 1 to Sound Level 2 upgrade kit
- Base barrier – elevated generator set
- Mufflers – industrial, residential or critical
- Alternator PMG excitation
- Alternator heater

Control System PowerCommand 1.1

PowerCommand control is an integrated generator set control system providing voltage regulation, engine protection, operator interface and isochronous governing (optional). Major features include:

- Battery monitoring and testing features and smart starting control system.
- Standard PCCNet interface to devices such as remote annunciator for NFPA 110 applications.
- Control boards potted for environmental protection.
- Control suitable for operation in ambient temperatures from -40 °C to +70 °C (-40 °F to +158 °F) and altitudes to 5000 meters (13,000 feet).
- Prototype tested; UL, CSA, and CE compliant.
- InPower™ PC-based service tool available for detailed diagnostics.

Operator/display panel

- Manual off switch
- Alpha-numeric display with pushbutton access for viewing engine and alternator data and providing setup, controls and adjustments (English or international symbols)
- LED lamps indicating generator set running, not in auto, common warning, common shutdown, manual run mode and remote start
- Suitable for operation in ambient temperatures from -40 °C to +70 °C
- Bargraph display (optional)

AC protection

- Over current warning and shutdown
- Over and under voltage shutdown
- Over and under frequency shutdown
- Over excitation (loss of sensing) fault
- Field overload

Engine protection

- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- Low coolant level warning or shutdown
- Low coolant temperature warning
- High, low and weak battery voltage warning
- Fail to start (over crank) shutdown
- Fail to crank shutdown
- Redundant start disconnect
- Cranking lockout
- Sensor failure indication
- Low fuel level warning or shutdown

Alternator data

- Line-to-Line and Line-to-neutral AC volts
- 3-phase AC current
- Frequency
- Total kVA

Engine data

- DC voltage
- Lube oil pressure
- Coolant temperature
- Engine speed

Other data

- Generator set model data
- Start attempts, starts, running hours
- Fault history
- RS485 Modbus® interface
- Data logging and fault simulation (requires InPower service tool)

Digital governing (optional)

- Integrated digital electronic isochronous governor
- Temperature dynamic governing

Digital voltage regulation

- Integrated digital electronic voltage regulator
- 2-phase Line-to-Line sensing
- Configurable torque matching

Control functions

- Time delay start and cooldown
- Cycle cranking
- PCCNet interface
- (2) Configurable inputs
- (2) Configurable outputs
- Remote emergency stop
- Automatic Transfer Switch (ATS) control
- Generator set exercise, field adjustable

Options

- Auxiliary output relays (2)
- Remote annunciator with (3) configurable inputs and (4) configurable outputs
- PMG alternator excitation
- PowerCommand 500/550 for remote monitoring and alarm notification (accessory)
- Auxiliary, configurable signal inputs (8) and configurable relay outputs (8)
- AC output analog meters (bargraph)
  - Color-coded graphical display of:
    - 3-phase AC voltage
    - 3-phase current
    - Frequency
    - kVa
- Remote operator panel
- PowerCommand 2.3 control with AmpSentry protection

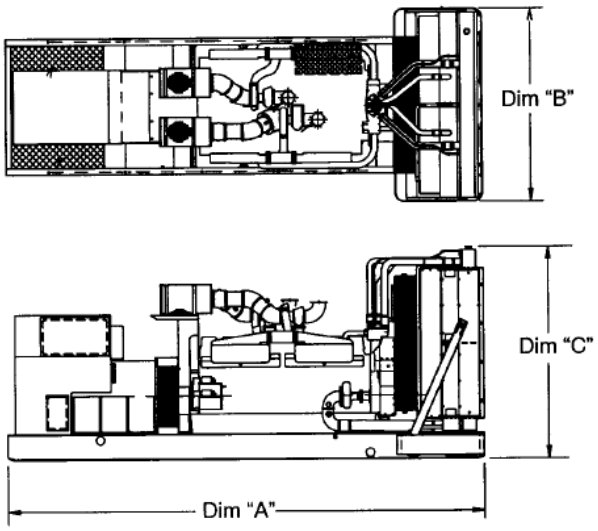
Ratings Definitions

Emergency Standby Power (ESP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Limited-Time Running Power (LTP):
Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.

Prime Power (PRP):
Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.

Base Load (Continuous) Power (COP):
Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.



This outline drawing is for reference only. See respective model data sheet for specific model outline drawing number.

Do not use for installation design

Codes and Standards

Codes or standards compliance may not be available with all model configurations – consult factory for availability.

	This generator set is designed in facilities certified to ISO 9001 and manufactured in facilities certified to ISO 9001 or ISO 9002.		The generator set is available Listed to UL 2200, Stationary Engine Generator Assemblies.
	The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Cummins products bearing the PTS symbol meet the prototype test requirements of NFPA 110 for Level 1 systems.	**U.S. EPA**	Engine certified to U.S. EPA SI Stationary Emission Regulation 40 CFR, Part 60.
	All low voltage models are CSA certified to product class 4215-01.	**International Building Code**	The generator set is certified to International Building Code (IBC) 2012.

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

For more information contact your local Cummins distributor or visit power.cummins.com

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NAS-6211-EN - 06DEC2019.DOCX (12/19) A055Y560

Generator set data sheet

Model:	C60D6C
Frequency:	60 Hz
Fuel type:	Diesel
KW rating:	60 standby 54 prime
Emissions level:	EPA Tier 3, Stationary emergency

Exhaust emission data sheet:	EDS-2027
Exhaust emission compliance sheet:	EPA-3034
Sound performance data sheet:	MSP-1301
Cooling performance data sheet:	MCP-1401
Prototype test summary data sheet:	PTS-450

Fuel consumption

	Standby				Prime			
	kW (kVA)				kW (kVA)			
Ratings	60 (75)				54 (68)			
Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
US gph	2.20	3.30	4.60	6.10	2.1	3.00	4.20	5.50
L/hr	8.33	12.49	17.41	23.09	7.95	11.36	15.90	20.82

Engine

	Standby rating	Prime rating
Engine manufacturer	Cummins Inc.	
Engine model	QSB5-G13	
Configuration	Cast iron, in-line, 4 cylinder	
Aspiration	Turbocharged and charge air cooled	
Gross engine power output, kWm (bhp)	129 (173)	113 (152)
BMEP at set rated load, kPa (psi)	1205 (174.7)	1083 (157.1)
Bore, mm (in)	107 (4.21)	
Stroke, mm (in)	124 (4.88)	
Rated speed, rpm	1800	
Piston speed, m/s (ft/min)	7.44 (1464)	
Compression ratio	17.3:1	
Lube oil capacity, L (qt)	12.2 (12.9)	
Overspeed limit, rpm	2250	

Fuel flow

Maximum fuel flow, L/hr (US gph)	133 (35.0)
Maximum fuel inlet restriction with clean filter, mm Hg (in Hg)	127 (5.0)

Air

	Standby rating	Prime rating
Combustion air, m3/min (scfm)	9.63 (340)	9.34 (330)
Maximum air cleaner restriction with clean filter, kPa (in H2O)	1.25 (5)	

Exhaust

Exhaust flow at set rated load, m^3/min (cfm)	20 (696)	18.52 (654)
Exhaust temperature, °C (°F)	370 (697)	341 (645)
Maximum back pressure, kPa (in H_2O)	10 (40.18)	10(40.18)
Available exhaust back pressure with CPG sound level 2 enclosure muffler, kPa (in H_2O)	3.5 (14.1)	4.5 (18.1)
Available exhaust back pressure with CPG weather enclosure muffler, kPa (in H_2O)	4.5 (18.1)	5 (20.1)

Standard set-mounted radiator cooling

Ambient design, ° C (° F)	50 (122)	
Fan load, kW_m (HP)	5.22 (7)	
Coolant capacity (with radiator), L (US Gal)	16 (4.2)	
Cooling system air flow, m^3/min (scfm)	218.04 (7700)	
Total heat rejection, MJ/min (Btu/min)	8.96 (8491)	8.38 (7943)
Maximum cooling air flow static restriction, kPa (in H_2O)	0.12 (0.5)	

Weight[2]

Unit wet weight kgs (lbs)	1006 (2217)

Notes:
[1] For non-standard remote installations contact your local Cummins Power Generation representative.
[2] Weights represent a set with standard features. See outline drawing for weights of other configurations.

Derating factors

Standby	Engine power available to 3581 m (11750 ft) and ambient temperatures up to 40° C (104° F). Above these conditions, derate at 2.2% per 300 m (1000 ft) and 16.1% per 10° C (18° F)
Prime	Engine power available to 4343 m (14250 ft) and ambient temperatures up to 40° C (104° F). Above these conditions, derate at 2.3% per 300 m (1000 ft) and 18.8% per 10° C (18° F)

Ratings definitions

Emergency standby power (ESP):	Limited-time running power (LTP):	Prime power (PRP):	Base load (continuous) power (COP):
Applicable for supplying power to varying electrical load for the duration of power interruption of a reliable utility source. Emergency Standby Power (ESP) is in accordance with ISO 8528. Fuel Stop power in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power to a constant electrical load for limited hours. Limited Time Running Power (LTP) is in accordance with ISO 8528.	Applicable for supplying power to varying electrical load for unlimited hours. Prime Power (PRP) is in accordance with ISO 8528. Ten percent overload capability is available in accordance with ISO 3046, AS 2789, DIN 6271 and BS 5514.	Applicable for supplying power continuously to a constant electrical load for unlimited hours. Continuous Power (COP) is in accordance with ISO 8528, ISO 3046, AS 2789, DIN 6271 and BS 5514.

Alternator data

Standard Alternators	Single phase[2]		Three phase[1]				
Maximum temperature rise above 40 °C ambient	120 °C	120 °C	120 °C	120 °C	120 °C	120 °C	120 °C
Feature code	BB88-2[3]	BB90-2	B946-2	B986-2	B943-2	B952-2	BB86-2
Alternator data sheet number	ADS-205	ADS-204	ADS-204	ADS-204	ADS-204	ADS-202	ADS-204
Voltage ranges	120/240	120/240	120/208	120/240	277/480	347/600	127/220
Voltage feature code	R104-2	R104-2	R098-2	R106-2	R002-2	R114-2	R020-2
Surge kW	69.3	71.0	73.3	73.3	73.9	72.6	73.5
Motor starting kVA (at 90% sustained voltage) Shunt			231	231	231	188	231
Motor starting kVA (at 90% sustained voltage) PMG			272	272	272	221	272
Full load current amps at standby rating	250	250	208	181	90	72	197

Alternator data

Standard Alternators	Single phase[2]		Three phase[1]				
Maximum temperature rise above 40 °C ambient	105 °C	105 °C	105 °C	105 °C	105 °C	105 °C	105 °C
Feature code	BB87-2[3]	BB91-2	BB93-2	BB94-2	BB95-2	BB92-2	BB85-2
Alternator data sheet number	ADS-207	ADS-205	ADS-204	ADS-204	ADS-204	ADS-204	ADS-204
Voltage ranges	120/240	120/240	120/208	120/240	277/480	347/600	127/220
Voltage feature code	R104-2	R104-2	R098-2	R106-2	R002-2	R114-2	R020-2
Surge kW	70.2	71.7	73.3	73.3	73.9	73.9	73.5
Motor starting kVA (at 90% sustained voltage) Shunt			231	231	231	231	231
Motor starting kVA (at 90% sustained voltage) PMG			272	272	272	272	272
Full load current amps at standby rating	250	250	208	181	90	72	197

Notes:
[1] Single phase power can be taken from a three phase generator set at up to 2/3 set rated 3-phase kW at 1.0 power factor
[2] Full single phase output up to full set rated 3-phase kW at 1.0 power factor
[3] Reconnectable option

Formulas for calculating full load currents:

Three phase output

$$\frac{kW \times 1000}{Voltage \times 1.73 \times 0.8}$$

Single phase output

$$\frac{kW \times SinglePhaseFactor \times 1000}{Voltage}$$

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect to any building's electrical system except through an approved device or after building main switch is open.

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Minneapolis, MN 55432
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Phone 763 574 5000
Fax 763 574 5298

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NAD-6334-EN (03/18) A059X434

power.cummins.com

2022 EPA Tier 3 Exhaust Emission Compliance Statement C60D6C Stationary Emergency

60 Hz Diesel Generator Set

Compliance Information:

The engine used in this generator set complies with Tier 3 emissions limit of U.S. EPA New Source Performance Standards for stationary emergency engines under the provisions of 40 CFR 60 Subpart IIII.

Engine Manufacturer:	Cummins Inc.
EPA Certificate Number:	NCEXL0275AAK-034
Effective Date:	08/09/2021
Date Issued:	08/09/2021
EPA Engine Family (Cummins Emissions Family):	NCEXL0275AAK

Engine Information:

Model:	QSB5-G13	Bore:	4.21 in. (106.9 mm)
Engine Nameplate HP:	173	Stroke:	4.88 in. (123.9 mm)
Type:	4 cycle, in-line, 4 cylinder	Displacement:	272 cu. in. (4.45 liters)
Diesel Aspiration:	Turbocharged	Compression Ratio:	17.3:1
Emission Control Device:		Exhaust Stack Diameter:	4 in. (102 mm)

Diesel Fuel Emission Limits

D2 Cycle Exhaust Emissions

	Grams per BHP-hr			Grams per kWm-hr		
	NO_x + NMHC	CO	PM	NO_x + NMHC	CO	PM
Test Results	2.8	0.7	0.11	3.8	1.0	0.15
EPA Emissions Limit	3.0	2.6	0.15	4.0	3.5	0.20

Test methods: EPA emissions recorded per 40 CFR Part 60, 89, 1039, 1065 and weighted at load points prescribed in the regulations for constant speed engines.

Diesel fuel specifications: Cetane number: 40-50, Reference: ASTM D975 No. 2-D, 300-500 ppm Sulphur

Reference conditions: Air Inlet Temperature: 25 °C (77 °F), Fuel Inlet Temperature: 40 °C (104 °F). Barometric Pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H2O/lb) of dry air; required for NOx correction, Restrictions: Intake Restriction set to a maximum allowable limit for clean filter; Exhaust Back Pressure set to a maximum allowable limit.

Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results.Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

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CERTIFICATE OF COMPLIANCE
SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Certification No.

VMA-51071-01C (Revision 10)

Expiration Date: 6/30/2024

Certification Parameters:

The nonstructural products (mechanical and/or electrical components) listed on this certificate are CERTIFIED[1] FOR SEISMIC APPLICATIONS in accordance with the following building code[2] releases.

IBC 2018, 2015, 2012

The following model designations, options, and accessories are included in this certification. Reference report number VMA-51071-01 as issued by The VMC Group for a complete list of certified models, included accessories/options, and certified installation methods.

Cummins Power Generation, Inc.; Diesel Gensets
Commercial Series; 10kW-200kW

The above referenced equipment is **APPROVED** for seismic application when properly installed[3], used as intended, and contains a Seismic Certification Label referencing this Certificate of Compliance[4]. As limited by the tabulated values, below grade, grade, and roof-level installations, installations in essential facilities, for life safety applications, and/or of equipment containing hazardous contents are permitted and included in this certification with an Equipment Importance Factor assigned as I_p=1.5. The equipment is qualified by successful seismic shake table testing at the nationally recognized Dynamic Certification Laboratories under the witness of the ISO Accredited Product Certification Agency, the VMC Group.

Certified Seismic Design Levels			
Certified **IBC**	**Importance $I_p \leq 1.5$** Soil Classes A-E Risk Categories I-IV Design Categories A-F	z/h ≤ 1.0	z/h = 0.0
		$S_{DS} \leq 2.000$ g	$S_{DS} \leq 2.500$ g

Certified Seismic Installation Methods
Rigid Mounting From Unit Base To Rigid Structure

HEADQUARTERS
113 Main Street
Bloomingdale, NJ 07403
Phone: 973.838.1780
Toll Free: 800.569.8423
Fax: 973.492.8430

CALIFORNIA
180 Promenade Circle
Suite 300
Sacramento, CA 95834
Phone: 916.634.7771

TEXAS
11930 Brittmoore Park Drive
Houston, TX 77041
Phone: 713.466.0003
Fax: 713.466.1355

thevmcgroup.com

VMC GROUP
THE POWER OF TOGETHER

CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Certified Product Table:

Model	Power Rating	RPM	Max Length (in)	Max Width (in)	Max Height (in)	Max Weight with Enclosure (lbs.)	S_{DS} (g) @ z/h = 0.0	S_{DS} (g) @ z/h = 1.0
C10 D6	10 kW	1800	98	34	88	4300	2	2
C15 D6	15 kW					4400		
C20 D6	20 kW					4470		
C25 D6	25 kW		131			5890		
C30 D6	30 kW					5930		
C35 D6	35 kW					5960		
C40 D6	40 kW					6140		
C50 D6	50 kW					6260		
C60 D6	60 kW							
C50 D6C	50 kW		170	40	104	8943	2.5	2.5
C60 D6C	60 kW					8990		
C80 D6C	80 kW					9040		
C100 D6C	100 kW					9216		
C125 D6C	125 kW					9300		
C125 D6D								
C150 D6D	150 kW		180	71	111	14300		
C175 D6D	175 kW							
C200 D6D	200 kW							

Group	Type	S_{DS} (z/h=0)	S_{DS} (z/h=1)	A_{Flex-H}	A_{Rig-H}	A_{Flex-V}	A_{Rig-V}	F_p/W_p
Seismic	AC156	2.00	2.00	3.20	2.40	1.33	0.53	1.44
		2.50				1.67	0.67	

This certification includes the open generator set and the enclosed generator set when installed with or without the sub-base tank. This certification also includes the sub-base tank as a stand-alone accessory. The generator set and included options shall be a catalogue design and factory supplied. The generator set and applicable options shall be installed and attached to the building structure per the manufacturer supplied seismic installation instructions. This certification excludes all non-factory supplied accessories, including but not limited to mufflers, isolation/restraint devices, remote control panels, remote radiators, pumps and other electrical/mechanical components.

IBC CERTIFIED VMC GROUP

VMA-51071-01C (Revision 10)
Issue Date: Friday, July 3, 2015
Revision Date: Friday, December 3, 2021
Expiration Date: Sunday, June 30, 2024

VMC GROUP
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CERTIFICATE OF COMPLIANCE
SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Notes & Comments:

1. All equipment listed herein successfully passed the seismic acceptance criteria for shake testing non-structural components and systems as set forth in the ICC AC-156. The Test Response Spectrum (TRS) enveloped the Required Response Spectrum (RRS) for all units tested. The tested units were representative sample(s) of a contingent of models and all remained captive and structurally sound after the seismic shake simulation. The units also remained functionally operational after the simulation testing as functional testing was completed by the equipment manufacturer before and after the seismic simulations. Although a seismic qualified unit inherently contains some wind resisting capacity, that capacity is undetermined and is excluded from this certification. Snow/Ice loads have been neglected and thus limit the unit to be installed both indoors (covered by an independent protective structure) and out of doors (exposed to accumulating snow/ice) for ground snow loads no greater than 30 psf for all applications.

2. The following building codes are addressed under this certification:
   IBC 2018 referencing ASCE7-16 and ICC-ES AC-156
   IBC 2015 referencing ASCE7-10 and ICC-ES AC-156
   IBC 2012 referencing ASCE7-10 and ICC-ES AC-156

3. Refer to the manufacturer supplied installation drawings for anchor requirements and mounting considerations for seismic applications. Required anchor locations, size, style, and load capacities (tension and shear) may be specified on the installation drawings or specified by a 3rd party. Mounting requirement details such as anchor brand, type, embedment depth, edge spacing, anchor-to-anchor spacing, concrete strength, special inspection, wall design, and attachment to non-building structures must be outlined and approved by the Engineer of Record for the project or building. Structural walls, structural floors, and housekeeping pads must also be seismically designed and approved by the project or building Structural Engineer of Record to withstand the seismic anchor loads as defined on the installation drawings. The installing contractor is responsible for ensuring the proper installation of all anchors and mounting hardware.

4. For this certificate and certification to remain valid, this certificate must correspond to the "Seismic Certification Label" found affixed to the unit by the factory. The label ensures the manufacturer built the unit in conformance to the IBC seismic design criteria set forth by the Certified Seismic Qualification Agency, the VMC Group, and meets the seismic design levels claimed by this certificate.

5. Mechanical, Electrical, and Plumbing connections to the equipment must be flexibly attached as to not transfer load through the connection. The structural integrity of any conduit, cable trays, piping, ductwork and/or flexible connections is the responsibility of others. This certification does not guarantee the equipment will remain compliant to NEMA, IP, UL, or CSA standards after a seismic event.

6. This certificate applies to units manufactured at:
   1400 73rd Ave NE, OF 143, Minneapolis, MN 55432

7. This certification follows the VMC Group's ISO-17065 Scheme.

John P. Giuliano, PE
President, VMC Group

IAS ACCREDITED Product Certification Agency

VMA-51071-01C (Revision 10)
Issue Date: Friday, July 3, 2015
Revision Date: Friday, December 3, 2021
Expiration Date: Sunday, June 30, 2024

IBC CERTIFIED VMC GROUP

Prototype Test Support (PTS)
60 Hz test summary

Generator set models

C50D6C C80D6C
C60D6C C100D6C

Representative prototype

Model: C100D6C
Alternator: UC27 D
Engine: QSB5-G5

The following summarizes prototype testing conducted on the designated representative prototype of the specified models. This testing is conducted to verify the complete generator set electrical and mechanical design integrity. Prototype testing is conducted only on generator sets not sold as new equipment.

Maximum surge power: 117.5 kW

The generator set was evaluated to determine the stated maximum surge power.

Maximum motor starting: 146.3 kVA

The generator set was tested to simulate motor starting by applying the specified kVA load at low lagging power factor (0.4 or lower). With this load applied, the generator set recovered to a minimum of 90% rated voltage.

Alternator temperature rise:

The highest rated temperature rise (120 °C) test results are reported as follows to verify that worst case temperature rises do not exceed allowable NEMA MG1 limits for class H insulation. Tests were conducted per IEEE 115, rise by resistance and embedded detector, with the rated voltages. Only the highest temperatures are reported.

Location	Maximum rise (ºC)
Alternator stator	N/A
Alternator rotor	N/A
Exciter stator	N/A
Exciter rotor	N/A

Torsional analysis and testing:

The generator set was tested to verify that the design is not subjected to harmful torsional stresses. A spectrum analysis of the transducer output was conducted.

Cooling system: 50 °C ambient
0.5 in. H_2O restriction

The cooling system was tested to determine ambient temperature and static restriction capabilities. The test was performed at full rated load in elevated ambient temperature under static restriction conditions.

Durability:

The C100D6C generator set was subjected to a minimum 500 hour endurance test operating at variable load up to the Standby rating based upon MIL-STD-705 to verify structural soundness and durability of the design.

Electrical and mechanical strength:

The generator set was tested to several single phase and three phase faults to verify that the generator can safely withstand the forces associated with short circuit conditions. The generator set was capable of producing full rated output at the conclusion of the testing.

Steady state performance:

The generator set was tested to verify if the steady state operating performance was within the specified maximum limits.

Voltage regulation:	± 1%
Random voltage variation:	± 1%
Frequency regulation:	± Isochronous
Random frequency variation:	± 0.5%

Transient performance:

The generator set was tested to verify single step loading capability as required by NFPA 110 and verify acceptable voltage and frequency response on load addition or rejection. The following results were recorded at 1.0 power factor:

Full load acceptance:

Voltage dip:	28%
Recovery time:	1.3 seconds
Frequency dip:	9.1%
Recovery time:	2.6 seconds

Full load rejection:

Voltage rise:	20.2%
Recovery time:	0.6 seconds
Frequency rise:	7.0%
Recovery time:	1.7 seconds

Harmonic analysis:

(per MIL-STD-705B, method 601.4)

	Line to Line		Line to Neutral	
Harmonic	No load	Full load	No load	Full load
3	0.04	0.15	0.15	0.15
5	0.2	0.2	0.2	0.2
7	0.6	0.6	0.6	0.6
9	0.02	0.04	0.04	0.04
11	0.52	0.52	0.52	0.52
13	0.26	0.26	0.26	0.26
15	0.0	0.0	0.0	0.0

Alternator data sheet

Frame size: UC3D

Characteristics

Weights:	Wound stator assembly:	265 lb	120 kg
	Rotor assembly:	317 lb	144 kg
	Complete alternator:	941 lb	427 kg
Maximum speed:		2250 rpm	
Excitation current:	Full load:	2 Amps	
	No load:	0.5 Amps	
Insulation system:	Class H throughout		

1 Ø Ratings (1.0 power factor)		**60 Hz**				**50 Hz**		
(Based on specific temperature rise at 40 ℃ ambient temperature)		Double delta		4 lead		Double delta		
		120/240		120/240		110-120 220-240		
125 ℃ rise ratings	kW/kVA	78/78		100/100		68/68		
105 ℃ rise ratings	kW/kVA	72/72		87/87		60/60		
3 Ø Ratings (0.8 power factor)		Upper broad range		LBR*	347/600	Broad range		
(Based on specified temperature rise at 40 ℃ ambient temperature)		120/208 240/416	139/240 277/480	190-208 380-416	347/600	110/190 220/380	120/208 240/415	127/220 254/440
150 ℃ Rise ratings	kW	110	124	110	124	97	97	92
	kVA	138	155	138	155	121	121	116
125 ℃ Rise ratings	kW	105	117	105	117	91	91	87
	kVA	131	146	131	146	114	114	109
105 ℃ Rise ratings	kW	96	105	96	105	80	80	74
	kVA	120	131	120	131	100	100	93
80 ℃ Rise ratings	kW	80	88	80	88	72	72	67
	kVA	100	110	100	110	90	90	84
3 Ø Reactances (per unit, ±10%)								
(Based on full load at 105 ℃ rise rating)								
Synchronous		2.53	2.08	2.00	1.82	2.11	1.77	1.46
Transient		0.21	0.17	0.16	0.16	0.18	0.15	0.12
Subtransient		0.14	0.12	0.12	0.12	0.13	0.11	0.09
Negative sequence		0.17	0.14	0.14	0.14	0.14	0.11	0.09
Zero sequence		0.10	0.08	0.08	0.08	0.08	0.07	0.06
3 Ø Motor starting								
Maximum kVA	(Shunt)	360		360	360	244		
(90% sustained voltage)	(PMG)	423		423	423	306		
Time constants	(Sec)							
Transient		0.030		0.030	0.030	0.030		
Subtransient		0.010		0.010	0.010	0.010		
Open circuit		0.820		0.820	0.820	0.820		
DC		0.007		0.007	0.007	0.007		

Alternator data sheet

Frame size: UC3D

Windings	(@ 20° C)				
Stator resistance	(Line to Line, Ohms)	0.0900	0.0680	0.1250	0.0900
Rotor resistance	(Ohms)	1.2000	1.2000	1.2000	1.2000
Number of leads		12	12	6	12

* Lower broad range 110/190 thru 120/208, 220/380 thru 240/416.

Specification Sheet

PowerCommand® 2.3 Control System

Control System Description

The PowerCommand control system is a microprocessor-based generator set monitoring, metering and control system designed to meet the demands of today's engine driven generator sets. The integration of all control functions into a single control system provides enhanced reliability and performance, compared to conventional generator set control systems. These control systems have been designed and tested to meet the harsh environment in which gensets are typically applied.

Features

- 320 x 240 pixels graphic LED backlight LCD.
- Multiple language support.
- AmpSentry™ protective relay - true alternator overcurrent protection.
- Real time clock for fault and event time stamping.
- Exerciser clock and time of day start/stop.
- Digital voltage regulation. Three phase full wave FET type regulator compatible with either shunt or PMG systems.
- Generator set monitoring and protection.
- 12 and 24 VDC battery operation.
- Modbus® interface for interconnecting to customer equipment.
- Warranty and service. Backed by a comprehensive warranty and worldwide distributor service network.
- Certifications - suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE, UKCA and CSA standards.

PowerCommand Digital Genset Control PCC 2300

Description

The PowerCommand generator set control is suitable for use on a wide range of generator sets in non-paralleling applications. The PowerCommand control is compatible with shunt or PMG excitation style. It is suitable for use with reconnectable or non-reconnectable generators, and it can be configured for any frequency, voltage and power connection from 120-600 VAC Line-to-Line.

Power for this control system is derived from the generator set starting batteries. The control functions over a voltage range from 8 VDC to 30 VDC.

Features

- 12 and 24 VDC battery operation.
- Digital voltage regulation - Three phase full wave FET type regulator compatible with either shunt or PMG systems. Sensing is three phase.
- Full authority engine communications (where applicable) - Provides communication and control with the Engine
- due to thermal Control Module (ECM).
- AmpSentry" protection provides industry-leading alternator overcurrent protection:
  - Time-based generator protection applicable to both line-to-line and line-to-neutral, that can detect an unbalanced fault condition and swiftly react appropriately. Balanced faults can also be detected by AmpSentry and appropriate acted upon.
- Reduces the risk of Arc Flash overload or electrical faults by inverse time protection
- Common harnessing - with higher feature Cummins controls. Allows for easy field upgrades.
- Generator set monitoring - Monitors status of all critical engine and alternator functions.
- Digital genset metering (AC and DC).
- Genset battery monitoring system to sense and warn against a weak battery condition.
- Configurable for single or three phase AC metering.
- Engine starting - Includes relay drivers for starter, Fuel Shut Off (FSO), glow plug/spark ignition power and switch B+ applications.
- Generator set protection – Protects engine and alternator.
- Real time clock for fault and event time stamping.
- Exerciser clock and time of day start/stop.
- Advanced serviceability - using InPower™, a PC-based software service tool.
- Environmental protection - The control system is designed for reliable operation in harsh environments. The main control board is a fully encapsulated module that is protected from the elements.
- Modbus interface for interconnecting to customer equipment.
- Configurable inputs and outputs - Four discrete inputs and four dry contact relay outputs.
- Warranty and service - Backed by a comprehensive warranty and worldwide distributor service network.
- Certifications - Suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE and CSA standards.

Base Control Functions

HMI Capability

Operator adjustments - The HMI includes provisions for many set up and adjustment functions.

Generator set hardware data - Access to the control and software part number, generator set rating in kVA and generator set model number is provided from the HMI or InPower.

Data logs - Includes engine run time, controller on time, number of start attempts, total kWh, and load profile (control logs data indicating the operating hours at percent of rated kW load, in 5% increments. The data is presented on the operation panel based on total operating hours on the generator.)

Fault history - Provides a record of the most recent fault conditions with control date and time stamp. Up to 32 events are stored in the control non-volatile memory.

Alternator data

- Voltage (single or three phase Line-to-Line and Line-to-Neutral)
- Current (single or three phase)
- kW, kVar, power factor, kVA (three phase and total)
- Frequency

AmpSentry: 3x current regulation for downstream tripping/motor inrush management. Thermal damage curve (3-phase short) or fixed timer (2 sec for 1- Phase Short or 5 sec for 2-Phase short).

Engine data

- Starting battery voltage
- Engine speed
- Engine temperature
- Engine oil pressure
- Engine oil temperature
- Intake manifold temperature
- Comprehensive Full Authority Engine (FAE) data (where applicable)

Service adjustments - The HMI includes provisions for adjustment and calibration of generator set control functions. Adjustments are protected by a password. Functions include:

Service adjustments (continued)

- Engine speed governor adjustments
- Voltage regulation adjustments
- Cycle cranking
- Configurable fault set up
- Configurable output set up
- Meter calibration
- Display language and units of measurement

Engine Control

SAE-J1939 CAN interface to full authority ECMs (where applicable). Provides data swapping between genset and engine controller for control, metering and diagnostics.

12 VDC/24 VDC battery operations - PowerCommand will operate either on 12 VDC or 24 VDC batteries.

Temperature dependent governing dynamics (with electronic governing) - modifies the engine governing control parameters as a function of engine temperature. This allows the engine to be more responsive when warm and more stable when operating at lower temperature levels.

Isochronous governing - (where applicable) Capable of controlling engine speed within +/-0.25% for any steady state load from no load to full load. Frequency drift will not exceed +/-0.5% for a 33 °C (60 °F) change in ambient temperature over an 8 hour period.

Droop electronic speed governing - Control can be adjusted to droop from 0 to 10% from no load to full load.

Remote start mode - It accepts a ground signal from remote devices to automatically start the generator set and immediately accelerate to rated speed and voltage. The remote start signal will also wake up the control from sleep mode. The control can incorporate a time delay start and stop.

Remote and local emergency stop - The control accepts a ground signal from a local (genset mounted) or remote (facility mounted) emergency stop switch to cause the generator set to immediately shut down. The generator set is prevented from running or cranking with the switch engaged. If in sleep mode, activation of either emergency stop switch will wakeup the control.

Sleep mode - The control includes a configurable low current draw state to minimize starting battery current draw when the genset is not operating. The control can also be configured to go into a low current state while in auto for prime applications or applications without a battery charger.

Engine starting - The control system supports automatic engine starting. Primary and backup start disconnects are achieved by one of two methods: magnetic pickup or main alternator output frequency. The control also supports configurable glow plug control when applicable.

Cycle cranking - Is configurable for the number of starting cycles (1 to 7) and duration of crank and rest periods. Control includes starter protection algorithms to prevent the operator from specifying a starting sequence that might be damaging.

Time delay start and stop (cooldown) - Configurable for time delay of 0-300 seconds prior to starting after receiving a remote start signal and for time delay of 0-600 seconds prior to shut down after signal to stop in normal operation modes. Default for both time delay periods is 0 seconds.

Alternator Control

The control includes an integrated three phase Line-to-Line sensing voltage regulation system that is compatible with shunt or PMG excitation systems. The voltage regulation system is a three phase full wave rectified and has an FET output for good motor starting capability.

Major system features include:

Digital output voltage regulation - Capable of regulating output voltage to within +/-1.0% for any loads between no load and full load. Voltage drift will not exceed +/- 1.5% for a 40 ºC (104 ºF) change in temperature in an eight hour period. On engine starting or sudden load acceptance, voltage is controlled to a maximum of 5% overshoot over nominal level. The automatic voltage regulator feature can be disabled to allow the use of an external voltage regulator.

Droop voltage regulation - Control can be adjusted to droop from 0-10% from no load to full load.

Torque-matched V/Hz overload control - The voltage roll-off set point and rate of decay (i.e. the slope of the V/Hz curve) is adjustable in the control.

Fault current regulation - PowerCommand will regulate the output current on any phase to a maximum of three times rated current under fault conditions for both single phase and three phase faults. In conjunction with a permanent magnet generator, it will provide three times rated current on all phases for motor starting and short circuit coordination purpose.

Protective Functions

On operation of a protective function the control will indicate a fault by illuminating the appropriate status LED on the HMI, as well as display the fault code and fault description on the LCD. The nature of the fault and time of occurrence are logged in the control. The service manual and InPower service tool provide service keys and procedures based on the service codes provided.

Protective functions include:

Battle Short Mode

When enabled and the *battle short* switch is active, the control will allow some shutdown faults to be bypassed. If a bypassed shutdown fault occurs, the fault code and description will still be annunciated, but the genset will not shutdown. This will be followed by a *fail to shutdown* fault. Emergency stop shutdowns and others that are critical for proper operation are not bypassed. Please refer to the control application guide or manual for list of these faults.

Derate

The derate function reduces output power of the genset in response to a fault condition. If a derate command occurs while operating on an isolated bus, the control will issue commands to reduce the load on the genset via contact closures or modbus.

Configurable Alarm and Status Inputs

The control accepts up to four alarm or status inputs (configurable contact closed to ground or open) to indicate a configurable (customer-specified) condition.

The control is programmable for warning, shutdown or status indication and for labeling the input.

Emergency Stop

Annunciated whenever either emergency stop signal is received from external switch.

Full Authority Electronic Engine Protection

Engine fault detection is handled inside the engine ECM. Fault information is communicated via the SAE-J1939 data link for annunciation in the HMI.

General Engine Protection

Low and high battery voltage warning - Indicates status of battery charging system (failure) by continuously monitoring battery voltage.

Weak battery warning - The control system will test the battery each time the generator set is signaled to start and indicate a warning if the battery indicates impending failure.

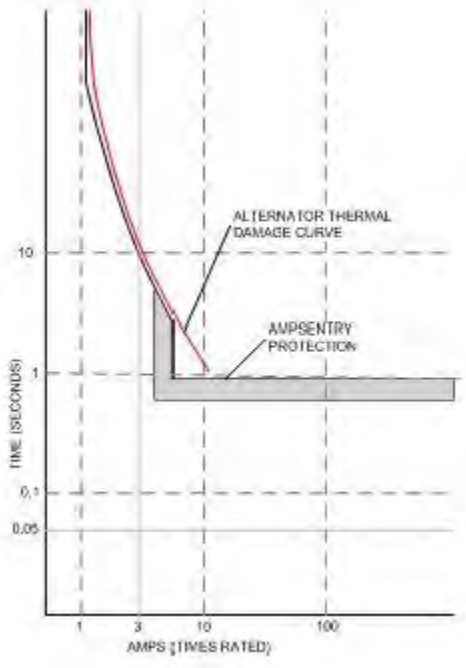
Fail to start (overcrank) shutdown - The control system will indicate a fault if the generator set fails to start by the completion of the engine crack sequence.

Fail to crank shutdown - Control has signaled starter to crank engine but engine does not rotate.

Cranking lockout - The control will not allow the starter to attempt to engage or to crank the engine when the engine is rotating.

Alternator Protection

AmpSentry protective relay - A comprehensive monitoring and control system integral to the PowerCommand Control System that guards the electrical integrity of the alternator and power system by providing protection against a wide array of fault conditions in the generator set or in the load. It also provides single and three phase fault current regulation so that downstream protective devices have the maximum current available to quickly clear fault conditions without subjecting the alternator to potentially catastrophic failure conditions. Thermal damage curve (3-Phase short) or fixed timer (2 sec for 1-Phase short, 5 sec for 2-Phase short). See document R1053 for a full-size time over current curve.



AmpSentry Maintenance Mode (AMM) - Instantaneous tripping, if AmpSentry Maintenance mode is active (50mS response to turn off AVR excitation/shutdown genset) for arc flash reduction when personnel are near genset.

High AC voltage shutdown (59) - Output voltage on any phase exceeds preset values. Time to trip is inversely proportional to amount above threshold. Values adjustable from 105-125% of nominal voltage, with time delay adjustable from 0.1-10 seconds. Default value is 110% for 10 seconds.

Low AC voltage shutdown (27) - Voltage on any phase has dropped below a preset value. Adjustable over a range of 50-95% of reference voltage, time delay 2-20 seconds. Default value is 85% for 10 seconds. Function tracks reference voltage. Control does not nuisance trip when voltage varies due to the control directing voltage to drop, such as during a V/Hz roll-off during synchronizing.

Under frequency shutdown (81 u) - Generator set output frequency cannot be maintained. Settings are adjustable from 2-10 Hz below reference governor set point, for a 5- 20 second time delay. Default: 6 Hz, 10 seconds.

Under frequency protection is disabled when excitation is switched off, such as when engine is operating in idle speed mode.

Over frequency shutdown/warning (81 o) - Generator set is operating at a potentially damaging frequency level. Settings are adjustable from 2-10 Hz above nominal governor set point for a 1-20 second time delay. Default: 6 Hz,
20 seconds, disabled.

Overcurrent warning/shutdown - Thresholds and time delays are configurable. Implementation of the thermal damage curve with instantaneous trip level calculated based on current transformer ratio and application power rating.

Loss of sensing voltage shutdown - Shutdown of generator set will occur on loss of voltage sensing inputs to the control.

Field overload shutdown - Monitors field voltage to shutdown generator set when a field overload condition occurs.

Over load (kW) warning - Provides a warning indication when engine is operating at a load level over a set point.

Adjustment range: 80-140% of application rated kW, 0-120 second delay. Defaults: 105%, 60 seconds.

Reverse power shutdown (32) - Adjustment range: 5-20% of standby kW rating, delay 1-15 seconds. Default: 10%, 3 seconds.

Reverse Var shutdown - Shutdown level is adjustable: 15-50% of rated Var output, delay 10-60 seconds. Default: 20%, 10 seconds.

Short circuit protection - Output current on any phase is more than 175% of rating and approaching the thermal damage point of the alternator. Control includes algorithms to protect alternator from repeated over current conditions over a short period of time.

Field Control Interface

Input signals to the PowerCommand control include:

- Coolant level (where applicable)
- Fuel level (where applicable)
- Remote emergency stop
- Remote fault reset
- Remote start
- Battleshort
- Rupture basin
- Start type signal
- Configurable inputs - Control includes (4) input signals from customer discrete devices that are configurable for warning, shutdown or status indication, as well as message displayed

Output signals from the PowerCommand control include:

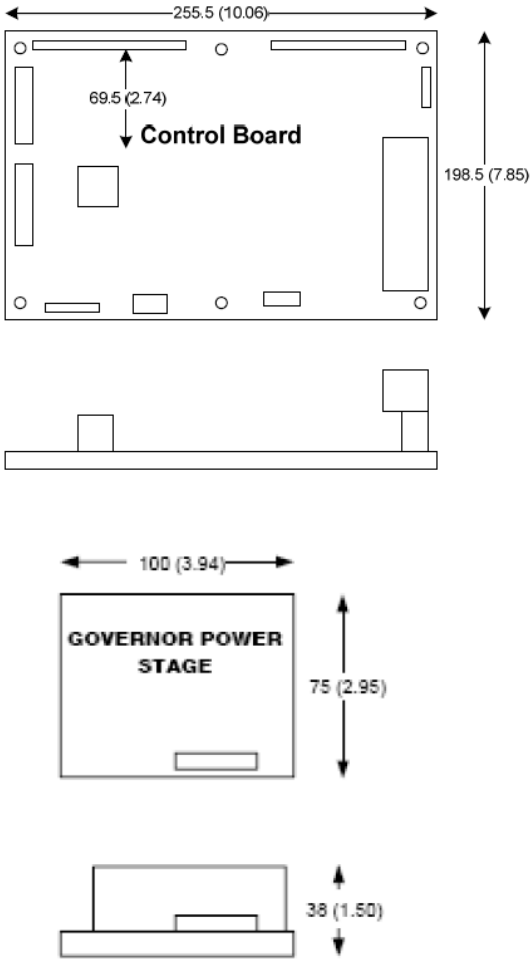
- Load dump signal: Operates when the generator set is in an overload condition.
- Delayed off signal: Time delay based output which will continue to remain active after the control has removed the run command. Adjustment range: 0 – 120 seconds. Default: 0 seconds.
- Configurable relay outputs: Control includes (4) relay output contacts (3 A, 30 VDC). These outputs can be configured to activate on any control warning or shutdown fault as well as ready to load, not in auto, common alarm, common warning and common shutdown.
- Ready to load (generator set running) signal: Operates when the generator set has reached 90% of rated speed and voltage and latches until generator set is switched to off or idle mode.

Communications Connections Include:

- PC tool interface: This RS-485 communication port allows the control to communicate with a personal computer running InPower software.
- Modbus RS-485 port: Allows the control to communicate with external devices such as PLCs using Modbus protocol.

  Note - An RS-232 or USB to RS-485 converter is required for communication between PC and control.
- Networking: This RS-485 communication port allows connection from the control to the other Cummins products.

Mechanical Drawings



PowerCommand Human Machine Interface HMI320

Description

This control system includes an intuitive operator interface panel that allows for complete genset control as well as system metering, fault annunciation, configuration and diagnostics. The interface includes five genset status LED lamps with both internationally accepted symbols and English text to comply with customer's needs. The interface also includes an LED backlit LCD display with tactile feel soft-switches for easy operation and screen navigation. It is configurable for units of measurement and has adjustable screen contrast and brightness.

The *run/off/auto* switch function is integrated into the interface panel.

All data on the control can be viewed by scrolling through screens with the navigation keys. The control displays the current active fault and a time-ordered history of the five previous faults.

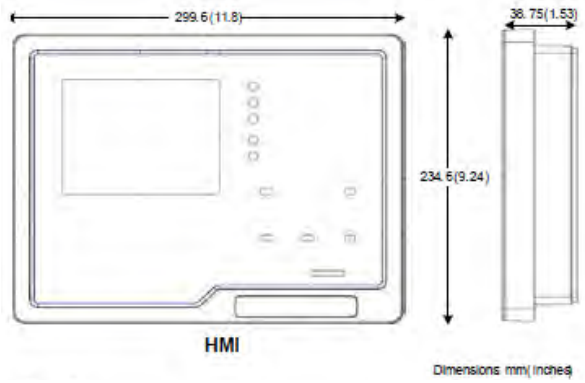
Features

- LED indicating lamps:
  - Genset running
  - Remote start
  - Not in auto
  - Shutdown
  - Warning
  - Auto
  - Manual and stop
- 320 x 240 pixels graphic LED backlight LCD.
- Four tactile feel membrane switches for LCD defined operation. The functions of these switches are defined dynamically on the LCD.
- Seven tactile feel membrane switches dedicated screen navigation buttons for up, down, left, right, ok, home and cancel.
- Six tactile feel membrane switches dedicated to control for auto, stop, manual, manual start, fault reset and lamp test/panel lamps.
- Two tactile feel membrane switches dedicated to control of circuit breaker (where applicable).
- Allows for complete genset control setup.
- Certifications: Suitable for use on generator sets that are designed, manufactured, tested and certified to relevant UL, NFPA, ISO, IEC, Mil Std., CE and CSA standards.
- LCD languages supported: English, Spanish, French, German, Italian, Greek, Dutch, Portuguese, Finnish, Norwegian, Danish, Russian and Chinese Characters.

Communications connections include:

- PC tool interface - This RS-485 communication port allows the HMI to communicate with a personal computer running InPower.
- This RS-485 communication port allows the HMI to communicate with the main control board.

Mechanical Drawing



Software

InPower (beyond 6.5 version) is a PC-based software service tool that is designed to directly communicate to PowerCommand generator sets and transfer switches, to facilitate service and monitoring of these products.

Environment

The control is designed for proper operation without recalibration in ambient temperatures from -40 ºC to +70º C (-40 ºF to 158 ºF) and for storage from -55 ºC to +80 ºC (-67 ºF to 176 ºF). Control will operate with humidity up to 95%, non-condensing.

The HMI is designed for proper operation in ambient temperatures from -20 ºC to +70 ºC (-4 ºF to 158 ºF) and for storage from -30 ºC to +80 ºC (-22 ºF to 176 ºF).

The control board is fully encapsulated to provide superior resistance to dust and moisture. Display panel has a single membrane surface, which is impervious to effects of dust, moisture, oil and exhaust fumes. This panel uses a sealed membrane to provide long reliable service life in harsh environments.

The control system is specifically designed and tested for resistance to RFI/EMI and to resist effects of vibration to provide a long reliable life when mounted on a generator set. The control includes transient voltage surge suppression to provide compliance to referenced standards.

Certifications

PowerCommand meets or exceeds the requirements of the following codes and standards:

- NFPA 110 for level 1 and 2 systems.
- ISO 8528-4: 1993 compliance, controls and switchgear.
- CE marking: The CE marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- UKCA marking: The UKCA marking is only valid when equipment is used in a fixed installation application. Material compliance declaration is available upon request.
- EN50081-1,2 residential/light industrial emissions or industrial emissions.
- EN50082-1,2 residential/light industrial or industrial susceptibility.
- ISO 7637-2, level 2; DC supply surge voltage test.
- Mil Std 202C, Method 101 and ASTM B117: Salt fog test.
- UL 6200 recognized and suitable for use on UL 2200 Listed generator sets.
- CSA C282-M1999 compliance
- CSA 22.2 No. 14 M91 industrial controls.
- PowerCommand control systems and generator sets are designed and manufactured in ISO 9001 certified facilities.

Warranty

All components and subsystems are covered by an express limited one year warranty. Other optional and extended factory warranties and local distributor maintenance agreements are available.

PCCNet COMPATIBLE

For more information contact your local Cummins distributor or visit power.cummins.com

Our energy working for you.™

PDS-1569 | PD00000157 | (02/22)

Data Sheet

Circuit Breakers

Description

This Data sheet provides circuit breaker manufacturer part numbers and specifications. The Circuit breaker box description is the rating of that breaker box installation on a Cummins Generator. Please refer to the website of the circuit breaker manufacturer for breaker specific ratings and technical information.

Applicable Models

Engine	Models					
Kubota	C10D6	C15D6	C20D6			
QSJ2.4	C20N6	C25N6	C30N6	C30N6H	C36N6	C36N6H
	C40N6	C40N6H	C50N6H	C60N6H		
B3.3	C25D6	C30D6	C35D6	C40D6	C50D6	C60D6
QSJ5.9G	C45N6	C50N6	C60N6	C70N6	C80N6	C100N6
QSJ8.9G	C125N6	C150N6				
QSB5	DSFAC	DSFAD	DSFAE	C50D6C	C60D6C	C80D6C
	C100D6C	C125D6C				
QSB7	DSGAA	DSGAB	DSGAC	DSGAD	DSGAE	
		C125D6D	C150D6D	C175D6D	C200D6D	
QSL9	DSHAD	DQDAA	DQDAB	DQDAC		
QSM11	DQHAB					
QSX15	DFEJ	DFEK				

Instructions

1. Locate the circuit breaker feature code or part number and use the charts below to find the corresponding manufacturer circuit breaker catalog number.

2. Use the first letter of the circuit breaker catalog number to determine the "frame" of the breaker. If the first letter is an “N”, use the second letter. Then follow the corresponding website link from the table below to find the breaker catalog number description.

Please refer to the catalog numbering systems page, which is given in the chart, to understand the nomenclature of the catalog number.

Frame	Catalog name*	Catalog number description page(s)
P	0612CT0101 http://www.schneider-electric.us/en/download/document/0612CT0101/	16-17
H, J, and L	0611CT1001 http://www.schneider-electric.us/en/download/document/0611CT1001/	8-9
Q	0734CT0201 http://www.schneider-electric.us/en/download/document/0734CT0201/	4

*The following link may also be used to search specifically by the breaker part number or for the catalog name listed above. http://products.schneider-electric.us/technical-library/

Feature Code	Breaker Box Description	Cummins Part #	Manufacturer	Breaker Catalog Number	Trip Unit	Plug Type
KX27-2	CB,Loc B,70A-250A,3P,LSI,600VAC,80%,UL	A050J727	Schneider Electric	JDL36250CU33X	MicroLogic 3.2S	N/A
KX28-2	CB,Loc B,70A-250A,3P,LSI,600VAC,100%,UL	A050J727	Schneider Electric	JDL36250CU33X	MicroLogic 3.2S	N/A
KX29-2	CB,Loc C,70A-250A,3P,LSI,600VAC,100%,UL	A050J727	Schneider Electric	JDL36250CU33X	MicroLogic 3.2S	N/A
KX30-2	CB,Loc A,125A-400A,3P,LSI,600VAC,100%,UL	A051D115	Schneider Electric	LGL36400CU33X	MicroLogic 3.3S	N/A
KX31-2	CB,Loc B,125A-400A,3P,LSI,600VAC,100%,UL	A051D115	Schneider Electric	LGL36400CU33X	MicroLogic 3.3S	N/A
KX32-2	CB,Loc A,200A-600A,3P,LSI,600VAC,80%,UL	A044T468	Schneider Electric	NLGL36600U33X-600A	MicroLogic 3.3S	N/A
KX33-2	CB,Loc B,200A-600A,3P,LSI,600VAC,80%,UL	A044T468	Schneider Electric	NLGL36600U33X-600A	MicroLogic 3.3S	N/A
KX34-2	CB,Loc C,15A,3P,600VAC,80%,UL	A043L506	Schneider Electric	HDL36015	Thermal Magnetic	N/A
KX35-2	CB,Loc C,20A,3P,600VAC,80%,UL	A043L480	Schneider Electric	HDL36020	Thermal Magnetic	N/A
KX36-2	CB,Loc C,25A,3P,600VAC,80%,UL	A043L508	Schneider Electric	HDL36025	Thermal Magnetic	N/A
KX37-2	CB,LoC C,30A,3P,600VAC,80%,UL	A043L475	Schneider Electric	HDL36030	Thermal Magnetic	N/A
KX38-2	CB,Loc C,40A,3P,600VAC,80%,UL	A043L464	Schneider Electric	HDL36040	Thermal Magnetic	N/A
KX39-2	CB,Loc C,50A,3P,600VAC,80%,UL	A043L461	Schneider Electric	HDL36050	Thermal Magnetic	N/A
KX40-2	CB,Loc C,60A,3P,600VAC,80%,UL	A043L459	Schneider Electric	HDL36060	Thermal Magnetic	N/A
KX41-2	CB,Loc C,70A,3P,600VAC,80%,UL	A043L451	Schneider Electric	HDL36070	Thermal Magnetic	N/A
KX42-2	CB,Loc C,80A,3P,600VAC,80%,UL	A043L012	Schneider Electric	HDL36080	Thermal Magnetic	N/A

PowerPact H-, J-, and L-Frame Circuit Breakers

Catalog
0611CT1001 R02/16

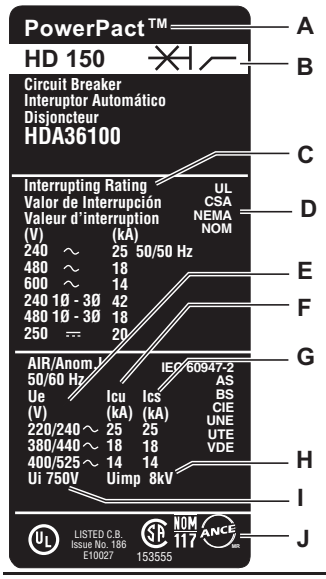
2015
Class 0611

CONTENTS

SQUARE D™
by Schneider Electric

General Characteristics

Faceplate Label



Characteristics indicated on the faceplate label:

A. Circuit breaker type
B. Circuit breaker disconnector symbol
C. Performance levels
D. Standards
E. Ue: Operating voltage per IEC
F. Icu: Ultimate breaking capacity per IEC
G. Ics: Service breaking capacity per IEC
H. Uimp: Rated impulse withstand voltage per IEC
I. Ui: Insulation voltage per IEC
J. Certification marks

NOTE: When the circuit breaker is equipped with an extended rotary handle, the door must be opened to view the faceplate.

Codes and Standards

H-, J-, and L-frame circuit breakers, automatic switches and electronic motor circuit protectors are manufactured and tested in accordance with the following standards.

NOTE: Apply circuit breakers according to guidelines detailed in the National Electric Code (NEC) and other local wiring codes.

Table 8: Codes and Standards (Domestic)

PowerPact H-, J-, and L-Frame Circuit Breakers	H-, J-, and L-Frame Switches	PowerPact H-, J-, and L-Frame Motor Circuit Protectors
UL 489[1]	UL 489[3]	UL 508
IEC 60947-2	IEC 60947-3	IEC 60947-2
CSA C22.2 No. 5[2]	CSA C22.2 No. 5[4]	CSA C22.2 No. 14
Federal Specification W-C-375B/GEN	Federal Specification W-C-375B/GEN	NEMA AB1
NEMA AB1	NEMA AB1	CCC
NMX J-266	NMX J-266	CE Marking
CCC	CE Marking	
CE Marking		

1 PowerPact H- and J-frame circuit breakers are in UL File E10027. PowerPact L-frame circuit breakers are in UL File E63335.

2 PowerPact H- and J-frame circuit breakers are in CSA File LR40970. PowerPact L-frame circuit breakers are in CSA File 69561.

3 PowerPact H- and J-frame switches are in UL File E87159.

4 PowerPact H- and J-frame switches are in CSA File LR32390.

Table 11: Circuit Breakers

Circuit Breaker		150 A H-Frame					250 A J-Frame					400 A L-Frame					600 A L-Frame					1200 A L-Frame	
Circuit Breaker Type		HD	HG	HJ	HL	HR	JD	JG	JJ	JL	JR	LD	LG	LJ	LL	LR	LD	LG	LJ	LL	LR	LG	LL
Number of poles[1]		2, 3				3	2, 3				3	3, 4					3, 4					4	
Amperage Range (A)		15-150					70-250					70-400					200-600					700-1200	
UL 489 Circuit Breaker Ratings																							
Breaking Capacity (AIR) UL/CSA/NOM (kA rms)	240 Vac	25	65	100	125	200	25	65	100	125	200	25	65	100	125	200	25	65	100	125	200	—	—
	480 Vac	18	35	65	100	200	18	35	65	100	200	18	35	65	100	200	18	35	65	100	200	—	—
	600 Vac	14	18	25	50	100	14	18	25	50	100	14	18	25	50	100	14	18	25	50	100	—	—
	250 Vdc[2]	20	20	20	20	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
	500 Vdc[2, 3]	—	20	—	50	—	—	20	—	—	50	—	20	—	—	50	—	20	—	20	—	20	50
IEC 947-2 Circuit Breaker Ratings																							
Ultimate breaking capacity (Icu) (kA rms)	220/240 Vac	25	65	100	125	150	25	65	100	125	150	25	65	100	125	150	25	65	100	125	150	—	—
	380/415 Vac	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	—	—
	440/480 Vac	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	18	35	65	100	125	—	—
	500/525 Vac	14	18	25	50	75	14	18	25	50	75	14	18	25	50	75	14	18	25	50	75[4]	—	—
	690 Vac	—	—	—	—	20	—	—	—	—	20	—	—	—	—	20	—	—	—	—	20	—	—
	250 Vdc[2]	—	—	—	—	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
	500 Vdc[2, 3]	—	—	—	—	—	20	20	20	20	—	—	—	—	—	—	—	—	—	—	—	—	—
Service breaking capacity (Ics)	% Icu	100%					100%					100%					100%					—	—
Insulation Voltage	V_i	750 Vac					750 Vac					750 Vac					750 Vac					—	—
Impulse Withstand Voltage	V_{imp}	8 kVac					8 kVac					8 kVac					8 kVac					—	—
Operational Voltage	V_e	690 Vac					690 Vac					690 Vac					690 Vac					—	—
Sensor Rating	I_n	150 A					250 A					400 A					600 A					—	—
Utilization Category	—	A					A					A					A					—	—
Operations (Open-Close Cycles)																							
Without Current		4000					5000					5000					5000					—	
With Current		4000					1000					1000					1000					—	
Protection and Measurements																							
Short-circuit protection	Magnetic only	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Overload/short-circuit protection	Thermal-magnetic	X	X	X	X	X	X	X	X	X	X	—	—	—	—	—	—	—	—	—	—	X	X
	Electronic	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with neutral protection (Off-0.5-1-OSN)[5]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with ground fault protection	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	with zone selective interlocking (ZSI)[6]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Display / I, V, f, P, E, THD measurements / interrupted-current measurement		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Options	Front display module (FDM121)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Operating assistance	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Counters	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Histories and alarms	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Metering Com	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
	Device status/control com	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	—	—
Dimensions / Weight / Connections																							
Dimensions (Three-Pole Unit Mount) in. (mm)	Height	6.4 (163)					7.5 (191)					13.38 (340)					13.38 (340)					13.38 (340)	
	Width	4.1 (104)					4.1 (104)					5.51 (140)					5.51 (140)					5.51 (140)	
	Depth	3.4 (86)					3.4 (86)					4.33 (110)					4.33 (110)					4.33 (110)	
Weight - lb. (Kg)		4.8 (2.2)					5.3 (2.4)					13.2 (6.0)					13.7 (6.2)					13.7 (6.2)	
Connections / Terminations	Unit Mount	X					X					X					X					X	
	I-Line	X					X					X					X					—	
	Rear Connection	X					X					X					X					X[7]	
	Plug-In	X					X					X					X					—	
	Drawout	X					X					X					X					—	
	Optional Lugs	X					X					X					X					—	

1 H and J-frame breakers with Micrologic trip units available only with three poles. The HJ, HL and the J-Frame two pole circuit breakers are three pole modules.

2 DC not available with PowerPact H, J or L-frame circuit breakers with Micrologic trip units.

3 500 Vdc specific catalog numbers, ungrounded UPS systems only.

4 I_{cs} for 600 A L-frame circuit breaker at 525 V is 19 kA.

5 OSN: Over Sized Neutral protection for neutrals carrying high currents (e.g. 3rd harmonics).

6 ZSI using restraint wires.

7 Rear connection is not available for 700–1200 A four pole L-frame circuit breakers.

PowerPact H-, J-, and L-frame Circuit Breaker Trip Units

Table 12: Micrologic Trip Unit Features

Features	Micrologic Trip Unit (X = Standard Feature, O = Available Option					
	Standard		Ammeter		Energy	
	3.2/3.3	3.2S/3.3S	5.2A/5.3A	6.2A/6.3A	5.2E/5.3E	6.2E/6.3E
LI	X					
LSI[1]		X	X		X	
LSIG/Ground Fault Trip[2]				X		X
Ground-Fault Alarm Trip				X		X
Current Settings Directly in Amperes	X	X	X	X	X	X
True RMS Sensing	X	X	X	X	X	X
UL Listed	X	X	X	X	X	X
Thermal Imaging	X	X	X	X	X	X
LED for Long-Time Pickup	X	X	X	X	X	X
LED for Long-Time Alarm	X	X	X	X	X	X
LED Green “Ready” Indicator	X	X	X	X	X	X
Up to 12 Alarms Used Together			X	X	X	X
Digital Ammeter			X	X	X	X
Zone-Selective Interlocking[3]			X	X	X	X
Communications	O	O	O	O	O	O
LCD Display			X	X	X	X
Front Display Module FDM121			O	O	O	O
Advanced User Interface			X	X	X	X
Neutral Protection			X	X	X	X
Contact Wear Indication[4]			X	X	X	X
Incremental Fine Tuning of Settings			X	X	X	X
Load Profile[4, 5]			X	X	X	X
Power Measurement					X	X
Power Quality Measurements					X	X

1 The LSI with 3.2S/3.3S trip units have fixed short time and long time delays.

2 Requires neutral current transformer on three-phase four-wire loads.

3 ZSI for H/J-frame devices is only OUT. ZSI for L-frame devices is IN and OUT.

4 Indication available using the communication system only.

5 % of hours in 4 current ranges: 0–49%, 50–79%, 80–89%, and >90% I_n.

Thermal-Magnetic or Electronic Trip Unit?

Thermal-magnetic trip units (available on H- and J-frame circuit breakers only) protect against overcurrents and short-circuits using tried and true techniques. For applications requiring installation optimization and energy efficiency, electronic trip units offering more advanced protection functions combined with measurements.

Trip units using digital electronics are faster as well as more accurate. Wide setting ranges make installation upgrades easier. Designed with processing capabilities, Micrologic trip units can provide measurement information and device operating assistance. With this information, users can avoid or deal more effectively with disturbances and can play a more active role in system operation. They can manage the installation, anticipate events and plan any necessary servicing.

L-Frame Circuit Breaker Catalog Numbers

Unit-Mount Circuit Breaker Catalog Numbers

Table 32: L-Frame 600 A Electronic Trip UL Rated Three-Pole Circuit Breakers (600 Vac, 50/60 Hz) With Factory Sealed Trip Unit Suitable for Reverse Connection

Electronic Trip Unit			Sensor Rating	Interrupting Rating (2nd Letter of Catalog Number)				
Type	Function	Trip Unit		D	G	J[1]	L[1]	R[1]
Standard (80%) Rated, 600 Vac, 50/60 Hz								
Standard	LI	3.3[2]	250 A[3]	LDL36250U31X	LGL36250U31X	LJL36250U31X	LLL36250U31X	LRL36250U31X
			400 A[4]	LDL36400U31X	LGL36400U31X	LJL36400U31X	LLL36400U31X	LRL36400U31X
			600 A[4]	LDL36600U31X	LGL36600U31X	LJL36600U31X	LLL36600U31X	LRL36600U31X
Standard	LSI	3.3S[2]	250 A[3]	LDL36250U33X	LGL36250U33X	LJL36250U33X	LLL36250U33X	LRL36250U33X
			400 A[4]	LDL36400U33X	LGL36400U33X	LJL36400U33X	LLL36400U33X	LRL36400U33X
			600 A[4]	LDL36600U33X	LGL36600U33X	LJL36600U33X	LLL36600U33X	LRL36600U33X
Ammeter	LSI	5.3A	400 A[4]	LDL36400U43X	LGL36400U43X	LJL36400U43X	LLL36400U43X	LRL36400U43X
			600 A[4]	LDL36600U43X	LGL36600U43X	LJL36600U43X	LLL36600U43X	LRL36600U43X
Energy	LSI	5.3E	400 A[4]	LDL36400U53X	LGL36400U53X	LJL36400U53X	LLL36400U53X	LRL36400U53X
			600 A[4]	LDL36600U53X	LGL36600U53X	LJL36600U53X	LLL36600U53X	LRL36600U53X
Ammeter	LSIG	6.3A[5]	400 A[4]	LDL36400U44X	LGL36400U44X	LJL36400U44X	LLL36400U44X	LRL36400U44X
			600 A[4]	LDL36600U44X	LGL36600U44X	LJL36600U44X	LLL36600U44X	LRL36600U44X
Energy	LSIG	6.3E	400 A[4]	LDL36400U54X	LGL36400U54X	LJL36400U54X	LLL36400U54X	LRL36400U54X
			600 A[4]	LDL36600U54X	LGL36600U54X	LJL36600U54X	LLL36600U54X	LRL36600U54X
100% Rated, 600 Vac, 50/60 Hz								
Standard	LI	3.3[2]	250 A[3]	LDL36250CU31X	LGL36250CU31X	LJL36250CU31X	LLL36250CU31X	LRL36250CU31X
			400 A[4]	LDL36400CU31X	LGL36400CU31X	LJL36400CU31X	LLL36400CU31X	LRL36400CU31X
Standard	LSI	3.3S[2]	250 A[3]	LDL36250CU33X	LGL36250CU33X	LJL36250CU33X	LLL36250CU33X	LRL36250CU33X
			400 A[4]	LDL36400CU33X	LGL36400CU33X	LJL3640C0U33X	LLL36400CU33X	LRL36400CU33X
Ammeter	LSI	5.3A	400 A[4]	LDL36400CU43X	LGL36400CU43X	LJL36400CU43X	LLL36400CU43X	LRL36400CU43X
Energy	LSI	5.3E	400 A[4]	LDL36400CU53X	LGL36400CU53X	LJL36400CU53X	LLL36400CU53X	LRL36400CU53X
Ammeter	LSIG	6.3A[5]	400 A[4]	LDL36400CU44X	LGL36400CU44X	LJL36400CU44X	LLL36400CU44X	LRL36400CU44X
Energy	LSIG	6.3E	400 A[4]	LDL36400CU54X	LGL36400CU54X	LJL36400CU54X	LLL36400CU54X	LRL36400CU54X

1 UL Listed/CSA Certified as current-limiting circuit breakers.

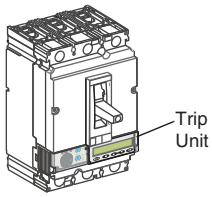
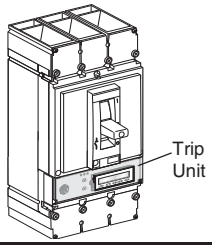
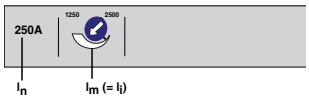
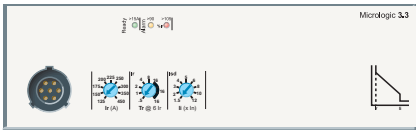
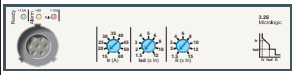
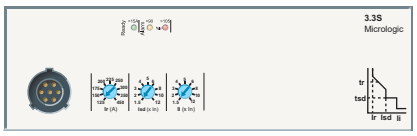
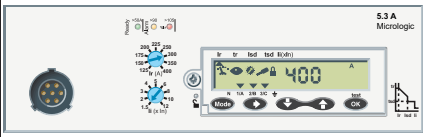
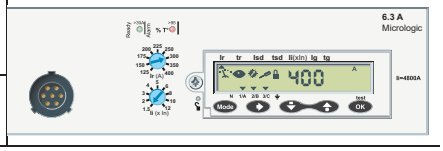
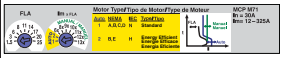
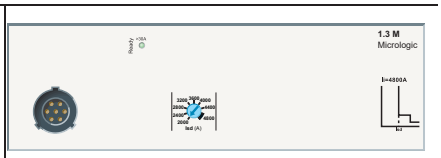
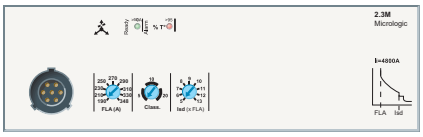
2 Three-pole circuit breakers with this trip unit can be used for two-pole applications.

3 Standard lug kit: AL400L61K3. Terminal wire range: (1) 2 AWG–600 kcmil Cu or (1) 2 AWG–500 kcmil Al. Type of terminal shield: short.

4 Standard lug kit: AL600LS52K3. Terminal wire range: (2) 2/0 AWG–500 kcmil Al/Cu. Type of terminal shield: medium.

5 Three-pole circuit breakers with this trip unit can be used for two-pole applications in order to have ground fault protection. Additional metering capabilities will not work properly on the unconnected phase.

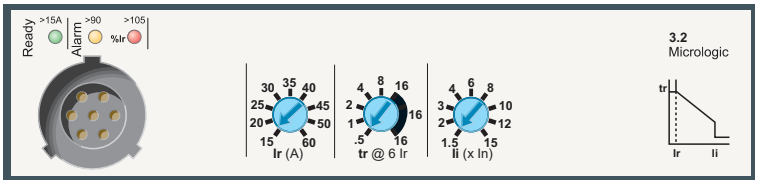
Table 62: Trip Unit Availability

Trip Unit Type	Trip Unit	H-, J-Frame	Trip Unit	L-Frame
				
Distribution Protection Thermal-Magnetic	T-M		N/A	
Distribution Protection LI	Micrologic 3.2 and 3.2-W		Micrologic 3.3 and 3.3-W	
Distribution Protection LSI Fixed ST and LT delays	Micrologic 3.2S and 3.2S-W		Micrologic 3.3S and 3.3S-W	
Distribution Protection LSI + Ammeter	Micrologic 5.2 A and 5.2 A-W		Micrologic 5.3 A and 5.3 A-W	
Distribution Protection LSI + Energy Monitoring	Micrologic 5.2 E and 5.2 E-W		Micrologic 5.3 E and 5.3 E-W	
Distribution Protection LSIG + Ammeter	Micrologic 6.2 A and 6.2 A-W		Micrologic 6.3 A and 6.3 A-W	
Distribution Protection LSIG + Energy Monitoring	Micrologic 6.2 E and 6.2 E-W		Micrologic 6.3 E and 6.3 E-W	
Motor Circuit Protection Magnetic Only	M		N/A	
Motor Protection Micrologic 1 M	N/A		Micrologic 1.3M	
Motor Protection Micrologic 2 M	Micrologic 2.2 M		Micrologic 2.3 M	

NOTE: W = mission critical trip unit.

Micrologic 3 Trip Units

Micrologic 3 trip units can be used on PowerPact H-, J-, and L-Frame circuit breakers with performance levels D/G/J/L.



They provide:

- standard protection of distribution cables
- indication of:
  - — overloads (using LEDs)
  - — overload tripping (using the SDx relay module)

Circuit breakers equipped with Micrologic 3 trip units can be used to protect distribution systems supplied by transformers.

Protection

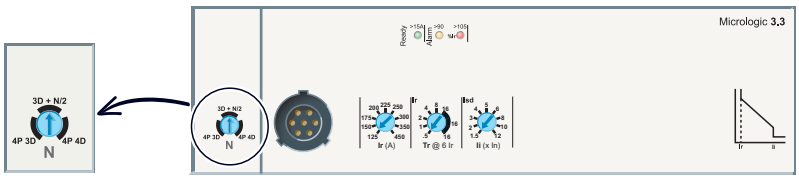
Settings are made using the adjustment rotary switches.

Overloads: Long time protection (I_r)

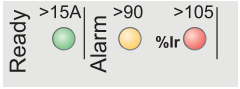
Inverse time protection against overloads with an adjustable current pick-up I_r set using a rotary switch and an adjustable time delay t_r.

Neutral protection

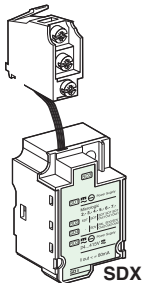
- On three-pole L-frame circuit breakers, neutral protection is not possible.
- On four-pole L-frame circuit breakers, neutral protection may be set using a three-position switch:
  - — switch position 4P 3D: neutral unprotected
  - — switch position 4P 3D + N/2: neutral protection at half the value of the phase pick-up, (0.5 x I_r)
  - — switch position 4P 3D: neutral fully protected at I_r



Indicators



Front Indicators



SDX Module

Front indicators

- The green “Ready” LED blinks slowly when the electronic trip unit is ready to provide protection. It indicates the trip unit is operating correctly.
- Orange overload pre-alarm LED: steady on when I > 90% I_r
- Red overload LED: steady on when I > 105% I_r

Remote indicators

An overload trip signal can be remotely checked by installing an SDx relay module inside the circuit breaker. This module receives the signal from the Micrologic electronic trip unit through an optical link and makes it available on the terminal block. The signal is cleared when the circuit breaker is reclosed. See page 120.

PowerPact H-, J-, and L-Frame Circuit Breakers
Trip Units

Table 64: Micrologic 3 Trip Unit

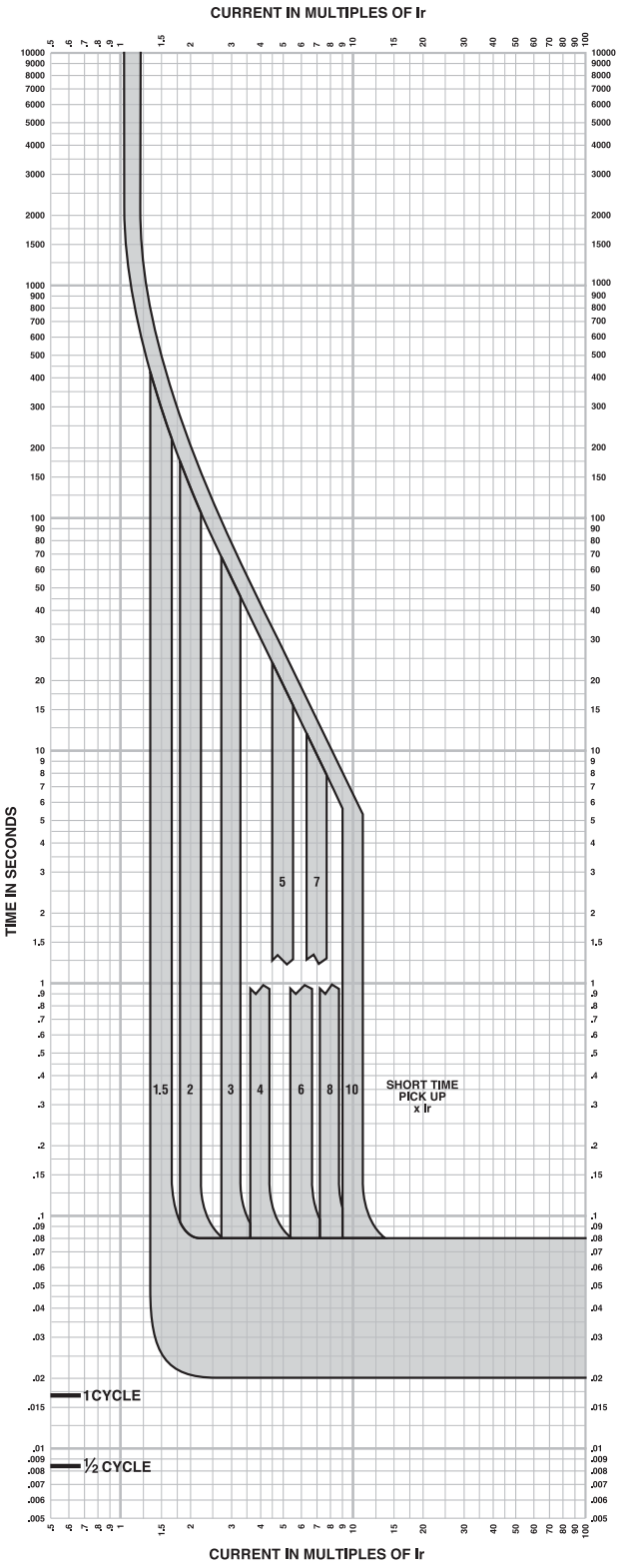
Ratings	I_n at 104°F (40°C)[1]		60 A	100 A	150 A	250 A	400 A	600 A			
Circuit Breaker	H-frame		X	X	X						
	J-frame					X					
	L-frame					X	X	X			
Micrologic 3.2 / 3.3 trip units[2]											
L Long-time protection											
Pick-Up (A) Tripping between 1.05 and 1.20 I_r	I_r		Value depending on sensor rating (I_n) and setting on rotary switch								
	I_n =60 A	I_r =	15	20	25	30	35	40	45	50	60
	I_n = 100 A	I_r =	35	40	45	50	60	70	80	90	100
	I_n = 150 A	I_r =	50	60	70	80	90	100	110	125	150
	I_n = 250 A	I_r =	70	80	100	125	150	175	200	225	250
	I_n = 400 A	I_r =	125	150	175	200	225	250	300	350	400
	I_n = 600 A	I_r =	200	225	250	300	350	400	450	500	600
Time Delay (s) Accuracy 0 to -20%	t_r		0.5	1	2	4	8	16			
		1.5 x I_r	15	25	50	100	200	400			
		6 x I_r	0.5	1	2	4	8	16			
		7.2 x I_r	0.35	0.7	1.4	2.8	5.5	11			
Thermal memory			20 minutes before and after tripping								
I Instantaneous											
Pick-up (A) accuracy ± 15%	I_i x	60 A, 100 A	1.5	2	3	4	6	8	10	12	15
		150 A	1.5	2	3	4	6	8	10	12	15
		250 A	1.5	2	3	4	5	6	8	10	12
		400 A	1.5	2	3	4	5	6	8	10	12
		600 A	1.5	2	3	4	5	6	8	10	11
	Non-tripping time Maximum break time		10 ms 50 ms for I > 1.5 Ii								
Micrologic 3.2S / 3.3S trip units[2]											
L Long-time protection											
Pick-Up (A) Tripping between 1.05 and 1.20 I_r	I_r		Value depending on sensor rating (I_n) and setting on rotary switch								
	I_n =60 A	I_r =	15	20	25	30	35	40	45	50	60
	I_n = 100 A	I_r =	35	40	45	50	60	70	80	90	100
	I_n = 150 A	I_r =	50	60	70	80	90	100	110	125	150
	I_n = 250 A	I_r =	70	80	100	125	150	175	200	225	250
	I_n = 400 A	I_r =	125	150	175	200	225	250	300	350	400
	I_n = 600 A	I_r =	200	225	250	300	350	400	450	500	600
Time Delay (s) Accuracy 0 to -20%	t_r		non-adjustable								
		1.5 x I_r	400								
		6 x I_r	16								
		7.2 x I_r	11								
Thermal memory			20 minutes before and after tripping								
S Short-time protection											
Pick-up (A) accuracy ± 10%	I_{sd} - I_r x...		1.5	2	3	4	5	6	7	8	10
Time delay (ms)	t_{sd}		non-adjustable								
	Non-tripping time Maximum break time		20 80								
I Instantaneous											
Pick-up (A) accuracy ± 15%	I_i x	60 A, 100 A	1.5	2	3	4	6	8	10	12	15
		150 A	1.5	2	3	4	6	8	10	12	15
		250 A	1.5	2	3	4	5	6	8	10	12
		400 A	1.5	2	3	4	5	6	8	10	12
		600 A	1.5	2	3	4	5	6	8	10	11
	Non-tripping time Maximum break time		10 ms 50 ms for I > 1.5 Ii								

1 If the trip units are used in high-temperature environments, the Micrologic trip unit setting must take into account the thermal limitations of the circuit breaker. See the temperature derating information on page 150.

2 Mission Critical trip units have a "-W" at the end of the number (for example 3.2-W). All other protections are the same and have the same trip curves.

PowerPact H-, J-, and L-Frame Circuit Breakers
Trip Curves

Figure 117: Micrologic 3.3S and 3.3S-W Electronic Trip Unit Long Time/Short Time Trip Curve



MICROLOGIC™ ELECTRONIC TRIP UNITS
Micrologic™ 3.3S and 3.3S-W
Long Time/Short Time Trip Curve
250A, 400A L-Frame

The time-current curve information is to be used for application and coordination purposes only.

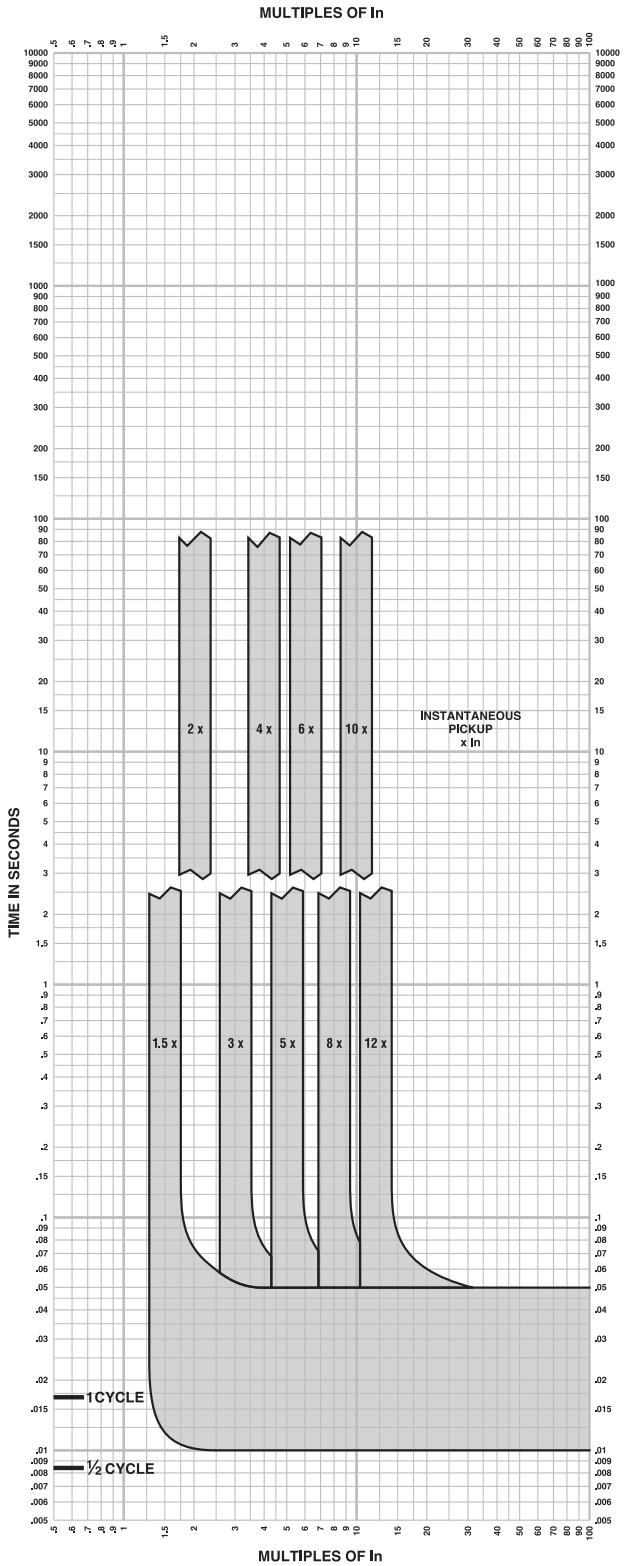
Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.

Curves apply from -35ºC to +70ºC (-31ºF to +158ºF) ambient temperature.

PowerPact H-, J-, and L-Frame Circuit Breakers
Trip Curves

Figure 119: Micrologic 3.3, 3.3-W, 3.3S, 3.3S-W, 5.3A, 5.3A-W, 5.3E, 5.3E-W, 6.3A, 6.3A-W, 6.3E, and 6.3E-W Electronic Trip Unit Instantaneous Trip Curve



MICROLOGIC™ ELECTRONIC TRIP UNITS
Micrologic™ 3.3, 3.3-W, 3.3S, 3.3S-W, 5.3A, 5.3A-W, 5.3E, 5.3E-W, 6.3A, 6.3A-W, 6.3E, and 6.3E-W
Instantaneous Trip Curve
400A L-Frame

The time-current curve information is to be used for application and coordination purposes only.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
3. In = Maximum dial setting of Ir.
   400A L-Frame: In = 400A = Max Ir setting

Curves apply from -35ºC to +70ºC (-31ºF to +158ºF) ambient temperature.

Coolant heaters

> Specification sheet

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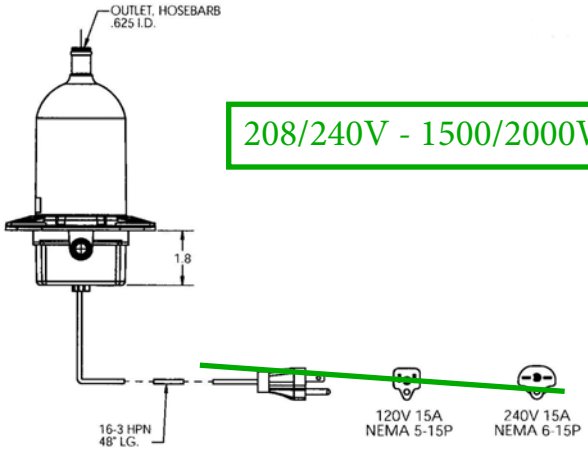
Power Generation

Control Thermostat Range	ON @ 80° F (27° C) OFF @ 100° F (38° C)
Control Thermostat Tolerance	±7.0° F (4° C) on close (ON) ±5.0° F (3° C) on open (OFF)
Approvals	UL Listed CSA Compliant CE Compliant



208/240V - 1500/2000W

Coolant Heater Kit	Critical Component	Voltage	Wattage	Heater Amps	Instruction Sheet
0333-0632-01	0333-0588-01	120	1000	8.3	000G-0406
0333-0632-01	0333-0588-01	120	1000	8.3	000G-0406
0541-0802-01	0333-0588-01	120	1000	8.3	000G-0539
0333-0548	0333-0588-01	120	1000	8.3	000G-0190
0179-4755-03	0333-0588-01	120	1000	8.3	000C-0703
0179-4938-03	0333-0588-01	120	1000	8.3	000G-0714
0333-0632-02	0333-0588-02	208/ 240	750/ 1000	3.6/ 4.16	000G-0406
0333-0632-02	0333-0588-02	208/ 240	750/ 1000	3.6/ 4.16	000G-0406
0541-0802-02	0333-0588-02	208/ 240	750/ 1000	3.6/ 4.16	000G-0539
0333-0549	0333-0588-02	208/ 240	750/ 1000	3.6/ 4.16	000G-0190
0179-4755-04	0333-0588-02	208/ 240	750/ 1000	3.6/ 4.16	000C-0703
0179-4938-04	0333-0588-02	208/ 240	750/ 1000	3.6/ 4.16	000G-0714
0300-5420-01	0333-0588-03	120	1500	12.5	000G-0447
0333-0631-01	0333-0588-03	120	1500	12.5	000G-0406
0333-0630-01	0333-0588-03	120	1500	12.5	000G-0406
0333-0631-01	0333-0588-03	120	1500	12.5	000G-0406
0300-5422-01	0333-0588-03	120	1500	12.5	000G-0453
0300-5422-01	0333-0588-03	120	1500	12.5	000G-0453
0333-0631-01	0333-0588-03	120	1500	12.5	000G-0406
0179-4902-03	0333-0588-03	120	1500	12.5	
0179-4908-03	0333-0588-03	120	1500	12.5	
0333-0713-03	0333-0588-03	120	1500	12.5	000G-0664

Specification sheet

Dual wall sub-base diesel fuel tanks -

10-200 kW generator sets

Description

Cummins® offers two series of fuel tanks (basic series and regional series) for the 10~125 kW diesel generator sets. The “basic” series of fuel tanks provide economical solutions for areas with no or minimal local/regional code requirements on diesel fuel tanks. The footprint of “basic” tanks matches the generator set’s footprint. The “regional” series of fuel tanks provide flexible and upgradable solutions for areas with extensive local/regional code requirements on diesel fuel tanks. The footprint of the “regional” series of fuel tanks extends beyond the generator set to allow room for installation of optional features at factory or accessories in the field for meeting local/regional code requirements or customer specification on diesel fuel tanks. All fuel tanks and optional features are compatible with factory installed enclosures.

These tanks are constructed of heavy gauge steel and include an internally reinforced baffle structure for supporting the generator set. The fuel tank design features fewer seams and welds for better corrosion resistance performance.

These tanks are pre-treated with a conversion coating and then finished with a textured powder paint. The paint has superior UV and chemical resistance with best-in-class adhesion, flexibility, and durability to resist chipping and substrate corrosion. Both interior compartments are treated with a rust preventative for extended corrosion protection.

These tanks are UL and ULC Listed as secondary containment generator base tanks. Inner and outer containments are leak checked per UL and ULC testing procedures to ensure their integrity.

These fuel tanks are offered in various sizes to satisfy different fuel capacities requirements.

Compatible generator set model

Engine	D1703M	V2203M	4BT3.3-G5	4BTAA3.3-G7	QSB5-G5	QSB7-G5
Generator set model names	C10D6	C20D6	C25D6	C50D6	C50D6C	C125D6D
	C15D6		C30D6	C60D6	C60D6C	C150D6D
			C35D6		C80D6C	C175D6D
			C40D6		C100D6C	C200D6D
					C125D6C	

Regional fuel tanks

Standard features:

UL 142 and ULC-S601 listed - Minimum 110% secondary IBC 2012 and 2015 certified - All optional features are seismically certified with this range of tanks and generator sets. Requires factory-installed 2 ft vent extensions or higher.

UL 142 & ULC-S601 listed - Minimum 125% secondary containment capacity.

NFPA & IFC - Capable of meeting NFPA 30, NFPA 110, and IFC codes with available factory-installed optional features.

Emergency pressure relief vents - Ensure adequate ventilation of the primary and secondary tank compartments under extreme temperature and emergency conditions.

Normal atmospheric vent - "Mushroom" style vent ensures adequate venting of the primary tank during fill, generator set running, and temperature variations. Raised above fuel fill.

Raised fuel fill - Includes lockable sealed fuel cap.

Lifting eyes - Allow lifting of fuel tank with generator set installed.

Optional features:

Secondary containment basin switch (rupture switch) - Activates a warning in the event of a primary tank leak. Side Mounted.

Low fuel level switch - Activates a warning when 40% of the fuel is left in the tank.

Fuel level gauge - Provides direct reading of fuel level. Top mounted.

Electric fuel level sender with gauge - Allows remote electrical monitoring of fuel tank level. Flying leads for customer connection.

Tank to foundation clearance - 2-inch bolt-thru risers allow visual inspection under tank including rodent barrier.

Spill containment box for fuel fill - 5 gallon capacity with integral drain (to tank). Lockable lid.

Overfill prevention valve - Shuts off fuel flow during filling at approximately 95% full*. Includes fill down tube, as needed, to terminate within 6" of the bottom of the fuel tank. Uses a 2 inch type "F" cam lock adapter for filling.

High fuel switch - Activates at 90% of full fuel level. Flying leads for customer connection.

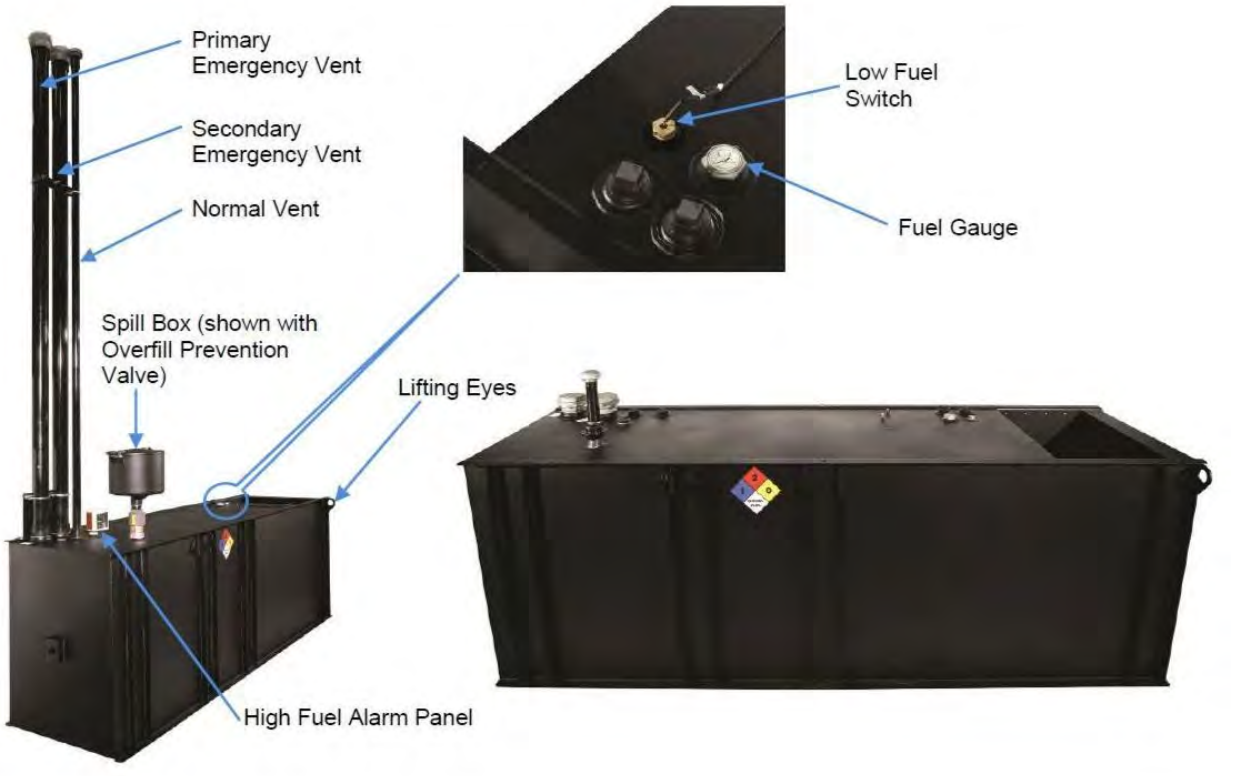
High fuel alarm panel - Provides audible & visual alarm when fuel level reaches 90% of full fuel level.

Fill drop tube - Terminates fuel fill location within 6" of the bottom of the fuel tank.

Vent extensions - Terminate normal and emergency vents (both primary and secondary) a minimum of 12 ft above the bottom of tank.

Seismic vent extensions - 2 ft normal and emergency (both primary & secondary) extensions to meet IBC/OSHPD seismic requirements.

* The OFPV inherently shuts off fuel at approximately 2" below the top of the fuel tank. Some tanks will shut off below this 95% fill level.



*Picture is for reference only. See outline drawing for tank specific information by model.

Regional tanks

Generator set Standby power output	Generator set model	Engine model	Fuel consumption (100% load, Standby)	Tank feature code	Minimum run time feature	Tank dimensions (L x W x H)	Nominal dry weight*	Tank usable volume	Actual run time w/o OFPV	Actual run time w/OFPV
kW			gal/hr		hr	inch	lbs	gal	hr	hr
10	C10 D6	D1703M	1.12	C301-2	24	87.6 x 34 x 15	510	74	66	56
				C303-2	48	87.6 x 34 x 15	510	74	66	56
				C305-2	72	87.6 x 34 x 23	723	132	118	107
				C307-2	96	87.6 x 34 x 23	723	132	118	107
15	C15 D6	D1703M	1.38	C301-2	24	87.6 x 34 x 15	510	74	53	45
				C303-2	48	87.6 x 34 x 15	510	74	53	45
				C305-2	72	87.6 x 34 x 23	723	132	95	86
				C307-2	96	87.6 x 34 x 32	962	195	141	132
20	C20 D6	V2203M	1.81	C301-2	24	87.6 x 34 x 15	510	74	41	35
				C303-2	48	87.6 x 34 x 23	723	132	73	66
				C305-2	72	87.6 x 34 x 32	962	195	108	101
				C307-2	96	87.6 x 34 x 32	962	195	108	101
25	C25 D6	4BT3.3-G5	2.42	C301-2	24	121 x 34 x 10.5	514	74	31	25
				C303-2	48	121 x 34 x 16.2	686	132	54	47
				C305-2	72	121 x 34 x 22.1	879	195	80	73
				C307-2	96	121 x 34 x 29.5	1120	263	109	101
30	C30 D6	4BT3.3-G5	2.81	C301-2	24	121 x 34 x 10.5	514	74	26	21
				C303-2	48	121 x 34 x 22.1	879	195	69	63
				C305-2	72	121 x 34 x 29.5	1120	263	94	87
				C307-2	96	121 x 34 x 42.0	1461	389	138	132
35	C35 D6	4BT3.3-G5	3.16	C301-2	24	121 x 34 x 16.2	686	132	42	36
				C303-2	48	121 x 34 x 22.1	879	195	62	56
				C305-2	72	121 x 34 x 29.5	1120	263	83	77
				C307-2	96	121 x 34 x 42.0	1461	389	123	117
40	C40 D6	4BT3.3-G5	3.66	C301-2	24	121 x 34 x 16.2	686	132	36	31
				C303-2	48	121 x 34 x 22.1	879	195	53	48
				C305-2	72	121 x 34 x 42.0	1461	389	106	101
				C307-2	96	121 x 34 x 42.0	1461	389	106	101
50	C50 D6	4BTAA3.3-G7	4.25	C301-2	24	121 x 34 x 16.2	686	132	31	27
				C303-2	48	121 x 34 x 29.5	1120	263	62	58
				C305-2	72	121 x 34 x 42.0	1461	389	92	87
60	C60 D6	4BTAA3.3-G7	5.04	C301-2	24	121 x 34 x 16.2	686	132	26	23
				C303-2	48	121 x 34 x 29.5	1120	263	52	49
				C305-2	72	121 x 34 x 42.0	1461	389	77	73
50	C50D6C	QSB5-G5	5.30	C301-2	24	154 x 40 x 22	1388	250	47	45
				C303-2	48	154 x 40 x 32	1657	425	80	76
				C305-2	72	154 x 40 x 32	1657	425	80	76
				C307-2	96	154 x 40 x 46	2096	625	118	112
60	C60D6C	QSB5-G5	6.10	C301-2	24	154 x 40 x 22	1388	250	41	39
				C303-2	48	154 x 40 x 32	1657	425	70	66
				C305-2	72	154 x 40 x 46	2096	625	102	97
				C307-2	96	154 x 40 x 46	2096	625	102	97
80	C80D6C	QSB5-G5	7.30	C301-2	24	154 x 40 x 22	1388	250	34	33
				C303-2	48	154 x 40 x 32	1657	425	58	55
				C305-2	72	154 x 40 x 46	2096	625	85	81
100	C100D6C	QSB5-G5	8.90	C301-2	24	154 x 40 x 22	1388	250	28	27
				C303-2	48	154 x 40 x 32	1657	425	48	45
				C305-2	72	154 x 40 x 46	2096	625	70	66
125	C125D6C	QSB5-G6	10.30	C301-2	24	154 x 40 x 22	1388	250	24	23
				C303-2	48	154 x 40 x 46	2096	625	60	58

* All weights are approximate.

Regional tanks

Generator set Standby power output	Generator set model	Engine model	Fuel consumption (100% load, Standby)	Tank feature code	Minimum run time feature	Tank dimensions (L x W x H)	Nominal dry weight*	Tank usable volume	Actual run time w/o OFPV	Actual run time w/OFPV
kW			gal/hr		hr	inch	lbs	gal	hr	hr
125	C125D6D	QSB7-G5	10.1	C301-2	24	180x40x21	1477	351	34	30
				C303-2	48	180x40x42	2302	737	72	69
				C305-2	72	180x40x42	2302	737	72	69
				C307-2	96	180x65.5x35.3	3552	1055	104	98
150	C150D6D		11.7	C301-2	24	180x40x21	1477	351	30	26
				C303-2	48	180x40x42	2302	737	63	59
				C305-2	72	180x65.5x35.3	3552	1055	90	84
175	C175D6D		13.3	C301-2	24	180x40x21	1477	351	26	23
				C303-2	48	180x40x42	2302	737	55	52
				C305-2	72	180x65.5x35.3	3552	1055	79	74
200	C200D6D		14.9	C301-2	24	180x40x21	1477	351	24	21
				C303-2	48	180x40x42	2302	737	49	47
				C305-2	72	180x65.5x35.3	3552	1055	72	66

Certifications/standards/codes

UL 142 Listed - Cummins dual wall sub-base tanks are UL Listed and constructed in accordance with Underwriters Laboratories Standard UL 142 “steel aboveground tanks for flammable and combustible liquids,” as a “secondary containment generator base tank”

NFPA - Cummins tanks are built in accordance with all applicable NFPA codes:

- NFPA 30 - Flammable and Combustible Liquids code
- NFPA 37 - Standard for Installation and use of Stationary Combustible Engine and Gas Turbines
- NFPA 110 - Standard for Emergency and Standby Power Systems

ISO9001 - This product was designed and manufactured in facilities certified to ISO9001.

ULC - Cummins tanks are built in accordance with all applicable ULC codes

For more information contact your local Cummins distributor or visit power.cummins.com

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NAAC-5868-EN (02/18)

Sound data
C60D6C
QSB5-G13 60Hz
Diesel Generator Set

Sound Pressure Level @ 7 meters, dB(A)

See notes 2,5,7-11 listed below

Configuration	Exhaust system	Position (Note 1)								8 Position Average
		1	2	3	4	5	6	7	8	
Standard – Unhoused	Infinite Exhaust	81.2	80.8	81.2	80.8	81.2	80.8	81.2	80.8	81.2
F216-2 Weather Protective Aluminium	Mounted	78.6	79.9	78.6	81.8	80.5	80.9	79.7	79.4	80.1
F231-2 Sound Attenuated Level 1, Aluminium	Mounted	78.4	75.2	70.7	72.8	72.5	72.9	72	74.9	74.3
F217-2 Sound Attenuated Level 2, Aluminium	Mounted	71.3	71	68.4	70.3	70.2	70.6	70.3	71.1	70.5

Sound Power Level, dB(A)

See notes 2-4, 7 and 8 listed below

Configuration		Octave Band Center Frequency (Hz)										Overall Sound Power Level
		31.5	63	125	250	500	1000	2000	4000	8000	16000	
Standard – Unhoused	Infinite Exhaust	53.8	79.2	87.9	92.3	100.4	102.0	101.1	97.2	93.1	88.0	107.0
F216-2 Weather Protective Aluminium	Mounted	55.2	86.0	94.5	96.0	100.5	101.9	100.1	96.9	92.1	82.6	107.0
F231-2 Sound Attenuated Level 1, Aluminium	Mounted	59.6	84.6	88.0	90.1	95.6	96.7	94.9	91.9	87.5	79.6	101.9
F217-2 Sound Attenuated Level 2, Aluminium	Mounted	57.1	84.8	87.7	88.4	92.6	91.7	89.6	87.1	82.9	72.4	98.2

Exhaust Sound Power Level, dB(A)

See notes 4,6 and 9 listed below

Open Exhaust (No Muffler) @ Rated Load	Octave Band Center Frequency (Hz)									Overall Sound Power Level
	31.5	63	125	250	500	1000	2000	4000	8000	
	56	82	96	102	108	111	112	111	109	118

Note:

1. Sound pressure levels at 1 meter are measured per the requirements of ISO 3744, ISO 8528-10, ANSI S1.13, ANSI S12.1 and European Communities Directive 2000/14/EC as applicable. The microphone measurement locations are 1 meter from a reference parallelepiped just enclosing the generator set (enclosed or unenclosed).
2. Seven-meter measurement location 1 is 7 meters (23 feet) from the generator (alternator) end of the generator set, and the locations proceed counter clockwise around the generator set at 45° angles at a height of 1.2 meters (48 inches) above the ground surface.
3. Sound Power Levels are calculated according to ISO 3744, ISO 8528-10, and or CE (European Union) requirements.
4. Exhaust Sound Levels are measured and calculated per ISO 6798, Annex A.
5. Reference Sound Pressure Level is 20 µPa.
6. Reference Sound Power Level is 1 pW (10-12 Watt).
7. Sound data for remote-cooled generator sets are based on rated loads without cooling fan noise.
8. Sound data for the generator set with infinite exhaust do not include the exhaust noise contribution.
9. Sound levels are subject to instrumentation, measurement, installation, and manufacturing variability

10. Unhoused/Open configuration generator sets refers to generator sets with no sound enclosures of any kind
11. Housed/Enclosed/Closed/Canopy configuration generator sets refer to generator sets that have noise reduction sound enclosuresinstalled over the generator set and usually integrally attached to the skid base/base frame/fuel container base of the generator set.

Specification Sheet

Battery and Accessories

Battery Specifications

Battery Part Number	Group Size	CCA	Reserve Capacity	Battery	Voltage	Length	Width	Height	Ship Weight lbs	Quarts Electrolyte
0416-0579	24	420	70	Dry	12	10.2	6.6	8.9	20	6.0
0416-0579-01	24	420	70	Wet	12	10.2	6.6	8.9	36	6.0
0416-1330	24XL	810	146	Wet	12	10.3	9.0	6.6	43	5.9
0416-1051	26	530	80	Wet	12	8.2	6.8	8.1	31	3.7
0416-1040	31	800	160	Dry	12	13.0	6.8	9.4	65	4.2
0416-0796	31	725	150	Wet	12	12.7	6.0	9.3	62	4.2
~~0416-0080~~	~~31~~	~~1000~~	~~185~~	~~Wet~~	~~12~~	~~13.0~~	~~6.8~~	~~9.5~~	~~69~~	~~4.2~~
A045P632	34	850	NA	Wet	12	10.3	6.6	8.0	NA	NA
~~0416-1291~~	~~34~~	~~800~~	~~100~~	~~Sealed~~	~~12~~	~~10.0~~	~~6.9~~	~~7.9~~	~~38~~	~~4.0~~
A030Y976	4D	1050	290	Wet	12	20.7	8.7	10.0	100	NA
0416-0439	8D	1400	430	Dry	12	20.8	10.7	9.5	110	16.0
0416-1264	8D	730	420	Dry	12	20.7	10.8	9.5	110	16.0
0416-1105	8D	1400	430	Wet	12	20.8	10.8	9.5	125	16.0
A062X621	24	800	135	Wet	12	10.1	6.8	8.7	42	N/A
A062X662	34	800	120	Wet	12	10.2	6.9	7.9	38	N/A

QTY - 2

Specification Sheet

Battery Charger-6 Amp

A045D925 60Hz/50Hz

Description

Cummins® fully automatic battery chargers are designed to both recharge your batteries, and extend your battery's life in applications where it is stored for long periods of time. This charger can handle poor power quality, exposure to extreme weather and rough handling.

To maximize battery life, a 3-stage charging cycle is implemented. The three charging stages are bulk stage, absorption stage and maintenance stage. During the bulk stage, the charger uses its full amp output to do the heaviest charging, quickly bringing your battery to about 75% of capacity. In the absorption stage, the current slows, adjusting for maximum charging efficiency while it gently tops off the battery to about 98% of capacity.

During the maintenance stage, a lower, closely-regulated, constant voltage is applied to maintain full charge and prevent discharge.

Unlike some "trickle chargers," the float charger won't apply more current than necessary to maintain full charge. Batteries can be connected indefinitely, without harm; in fact, the float charge extends battery life.

Features

Protection – Surge protected to IEEE and EN standards. All models include single pole cartridge type fuses mounted on the printed circuit board to protect against input or output overcurrent.

Lightweight and Silent – Lighter than transformer types, completely silent but still provides full output when overloaded outlets drop AC voltage below the normal 115V.

Monitoring – Status LED indicators are provided to show the condition or charging status of the battery. When the red LED is on, it indicates that the battery is discharged and is recharging at the 'BULK' rate. When both the red and green LEDs are on, the battery is charging at the 'midrange' rate. When the green LED is on, the battery is 90% charged and ready for use.

Construction – Made using epoxy-potted cases making it the ultimate in durability, completely waterproof and able to withstand numerous caustic chemicals and gases, as well as being shockproof.

Fault Indication – The charger senses and indicates the following fault conditions: Defective or damaged cells, under-voltage at the battery, battery drawing more current than charger can replace, loss of power or extremely low AC voltage at the charger, other battery fault conditions and charger failure.

Compatibility – Works with Sealed Lead Acid (SLA), Absorbed Glass Mat (AGM) and Gel type batteries.

Low Electromagnetic and Radio

Frequency Interference – This product meets FCC class B for conducted and radiated emissions.

Listed – This product is UL listed according to the UL 1236 Standard.

Warranty – This product has a two-year warranty

Specifications

Performance and Physical Characteristics

Output:	Nominal voltage	12 VDC
	Float voltage – 12 V batteries	13.0-13.6 VDC at 0-2 amps
	Maximum output current	6 A @ 12 VDC nom
Input:	Voltage AC	115, 208, 240 ±10%, 90-135
	Frequency	60 Hz ±5%
Battery:	Maximum battery size	150 Amp Hours
	Maximum recharge time	20 hours
Approximate net weight		4 lbs. (1.81 Kg)
Approximate dimensions: height x width x depth-in(mm)		2.25 x 6.4 x 3.5 (57 x 162 x 89)
Ambient temperature operation: At full rated output		-40°F to 122 °F (-40 °C to 50 °C)

Warning: Back feed to a utility system can cause electrocution and/or property damage. Do not connect generator sets to any building electrical system except through an approved device or after building main switch is open.

Warning: For professional use only. Must be installed by a qualified service technician. Improper installation presents hazards of electrical shock and improper operation, resulting in severe personal injury and/or property damage.

For more information contact your local Cummins distributor or visit power.cummins.com

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NAAC-5943-EN PDA059R693 (03/22)

Specification sheet

PowerCommand® input/output expansion module AUX 101 and AUX 102

Description

The PowerCommand AUX 101 input/output module and the AUX 102 input/output expansion module provide up to sixteen (16) relay output and up to twelve (12) discrete/analog inputs for auxiliary control and monitoring of the power system.

Analog/discrete inputs can be used for system fault expansion and/or generator set metering.

Relay outputs can be used for controlling equipment such as motors, louvers, lamps, fans and pumps. The relays may be configured individually from the genset control operator interface or using InPower™ software.

The AUX 101 and AUX 102 modules are compatible with genset controls supporting a PCCNet network and require a twisted pair connection. This includes the PCC 1301 control.

AUX 101 - Contains eight (8) Form-C relay output sets and eight (8) discrete/analog inputs.

AUX 102 - Easily connects to the AUX 101 to provide an additional eight (8) Form-C relay outputs and (4) additional discrete inputs.

AUX 102 - Expansion

Features

- Up to sixteen (16) configurable Form-C relays provide easy control of system equipment such as lamps, louvers, motors and pumps. LED status of each relay.
- Up to twelve (12) configurable discrete inputs for monitoring equipment status and faults. Equipment status and faults will be annunciated.
- Up to eight (8) analog inputs. Analog inputs can be assigned one of seven preprogrammed functions:
  - Oil temperature
  - Exhaust temperature
  - Fuel level
  - Ambient temperature
  - Alternator RTD
  - Speed bias (for manual paralleling only)
  - Voltage bias (for manual paralleling only)
- Two 5 VDC voltage sources for use with active senders.
- Four programmable current sources for use with resistive senders.
- Two status LEDs:
  - DS1 (green) indicates the AUX 101 is connected to the network and operating normally
  - DS2 (red) indicates the AUX 101 has lost its connection or is not connected to the network
- Device number indicator. Seven segment LED used to uniquely define more than one AUX 101 on the same network.
- May be connected at any point in the PCCNet network.
- Plug-and-play networking - No binding required.
- Pluggable terminal blocks allow easy one-time wiring.
- Less wiring makes installation and system upgrades quick and easy
- PowerCommand controls are supported by a worldwide network of independent distributors who provide parts, service and warranty support.
- UL Listed and labeled; CSA certified; CE and UKCA compliant.

Specifications

Signal requirements

Network connections: RS485, twisted-pair 78 kbps
Control power: 5-40 VDC
Current

- 200 mA typical at 12 V, no active relay
- 100 mA typical at 24 V, no active relay
- 800 mA at 12 V, all relays active

Terminations for control power accept wire up to 16 ga.

Environment

The AUX 101 and AUX 102 are designed for proper operation in ambient temperatures from -40 °C to +60 °C (-40 °F to +140 °F) and for storage from -40 °C to +80 °C (-40 °F to +176 °F). Modules will operate with humidity up to 95%, non-condensing

Relay ratings (AUX 101)

- Normally closed: 3 A at 250 VAC or 30 VDC
- Normally open: 5 A at 250 VAC or 30 VDC

Relay ratings (AUX 102)

- 2 A at 125 VAC, 2 A at 30 VDC

Input ratings (AUX 101)

- Active low inputs
- Maximum voltage 24 VDC (inputs 1 - 6)
- Maximum voltage 40 VDC (inputs 7 - 8)

Network length

Maximum 1219 m (4000 ft)

Approved wiring

Cat 4 or Cat 5 (stranded)

Configurations

All configurations are stored in the main genset control and are modified from the generator set control HMI or using InPower PC software.

Discrete/analog inputs:

Each AUX 101 input can be configured as discrete or analog. AUX 102 inputs are discrete only. Discrete inputs have the following configuration options:

- Active high or active low
- Event, warning or shutdown
- Programmable text (displayed on genset HMI and InPower software)

Analog inputs have a set of predefined functions and can only be configured on certain module inputs. Below is a list of functions and possible module inputs:

- Input 1 - Voltage bias (-3 to +3 VDC)*
- Input 2 - Speed bias (0 to +5 VDC)*
- Inputs 3 – 6
  - Oil temperature
  - Exhaust temperature
  - Ambient air temperature
  - Fuel level
  - Alternator temperature

Inputs are defaulted to disabled

* Please note that speed and voltage bias interfaces are for manual paralleling only and must not be used with automatic paralleling controls.

Relay outputs

Outputs can be configured to energize on occurrence of any event or fault code supported by the genset control. The relay outputs default to the following:

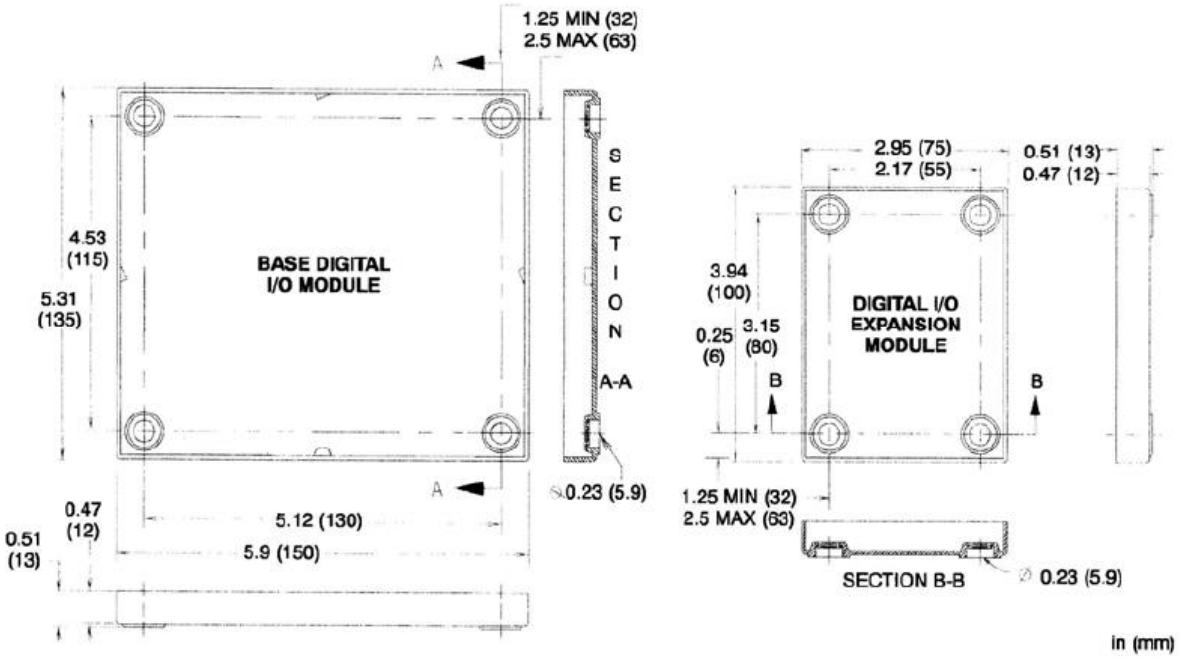
AUX 101

1 - Low oil pressure
2 - High engine temperature
3 - Charger AC failure
4 - Battery (low, weak, high)
5 - Engine overspeed
6 - Fail-to-start
7 - Not-in-auto
8 - Generator set running

AUX 102

9 - Pre-low oil pressure
10 - Pre-high engine temperature
11 - Low coolant level*
12 - Low fuel level*
13 - Low coolant temperature
14 - Common alarm
15 - Not defined
16 - Not defined

Dimensions



Ordering information

Part number	Description
0541-1291	AUX 101 Digital Input/output Module - Base – PCC 1301
0184-0263	AUX 101 Digital Input/output Module - Base – PCC 1301 on DN and GN model generator sets
0630-3142	AUX 102 Digital Input/output Module wiring diagram - Instruction sheet C693
0541-0772	AUX 102 Digital Input/output Module - Expansion

Factory Mounted

PCCNet logo

Look for this logo on spec sheets of PCCNet compatible devices.

PCCNet COMPATIBLE

For more information contact your local Cummins distributor or visit power.cummins.com

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Specification sheet

PowerCommand® annunciator discrete input or PCCNet

Description

The Universal Annunciator Module provides visual and audible indication of up to 20 separate alarm or status conditions, based on discrete (relay) inputs or network inputs. Each LED can be controlled by either a discrete wire input or by a signal on the PCCNet network sent from an external device, such as a PCC1301 or PCC2100 (version 2.4 or later) control.

In addition to the LEDs, the annunciator can control four custom relays based on signals received over the PCCNet. When one of the annunciator's discrete inputs is activated, the annunciator will broadcast that information over the network. By taking advantage of the network, discrete inputs and custom relays, the annunciator can be used as expanded I/O for a genset controller.

Easily installed in a location to give immediate notification of an alarm or warning status. Designed to give operating/monitoring personnel quick-glance status information. The module directly senses battery voltage to provide green/yellow/red alarm and status information for that parameter.

Genset controller complies with NFPA level two requirements when used with the display but without the annunciator panel. When used with the annunciator it meets NFPA level one requirements (Emergency and Standby power systems). The annunciator module can also be used for monitoring of transfer switch or other equipment status.

Features

- Visual and audible warnings of up to 20 separate alarm or status conditions.
- LEDs can be controlled either via PCCNet or discrete input.
- Status of discrete inputs is broadcast on network.
- Four custom relays can be controlled over the PCCNet network.
- Configurable LED color (red, yellow or green) and selectable horn operation allows maximum flexibility.
- Standard NFPA 110 label, field configurable for other alarm status and conditions.
- Each audible alarm is annunciated, regardless of the number of existing alarm conditions displayed.
- Sealed membrane panel design provides environmental protection for internal components and is easy to clean.
- Configurable for negative (ground) input or positive input.
- Integral DC voltage sensing.
- Flush or surface mount provisions.
- UL Listed and labeled; CSA certified; CE and UKCA marked.

Specifications

Signal requirements

Positive - Input impedance is 1.82 kOhms to ground; maximum input voltage = 31 VDC.

Negative - Input impedance is 1.82 kOhms to Bat+: inputs are at Bat+ level when open.

Sink/source current threshold for detection - 150 Ua minimum, 3 mA maximum.

Typical conductor size: 16 ga for 304.8 m (1000 ft)

Max conductor size for terminal: 12 ga

Relay outputs

0.2 A at 125 VAC and 1 A at 30 VDC

Network connections

Use Belden 9729 two pair, stranded, shielded 24 AWG twisted pair cable for all PCCNet connections. Total network length cannot exceed 1219 m (4000 ft). Up to 20 nodes can be connected to the network.

Note: Any communications wire connected to the generator set should be stranded cable.

Power

Maximum consumption: 15 watts

Battery voltage

Functional range - Audible and visual conditions operational from 6.5 to 31 VDC.

Low voltage setting - 12.0 VDC for 12 Volt nominal systems; 24.0 for 24 Volt nominal systems.

High voltage setting - 16.0 Volt for 12 Volt nominal systems; 32.0 Volt for 24 Volt nominal systems.

Alarm horn

Sound level: 90 dB at 30 cm

Physical

Weight (with enclosure): 1.4 kg (3.0 lbs)

Temperature

-20 °C to +70 °C (-4 °F to +158 °F)

Humidity

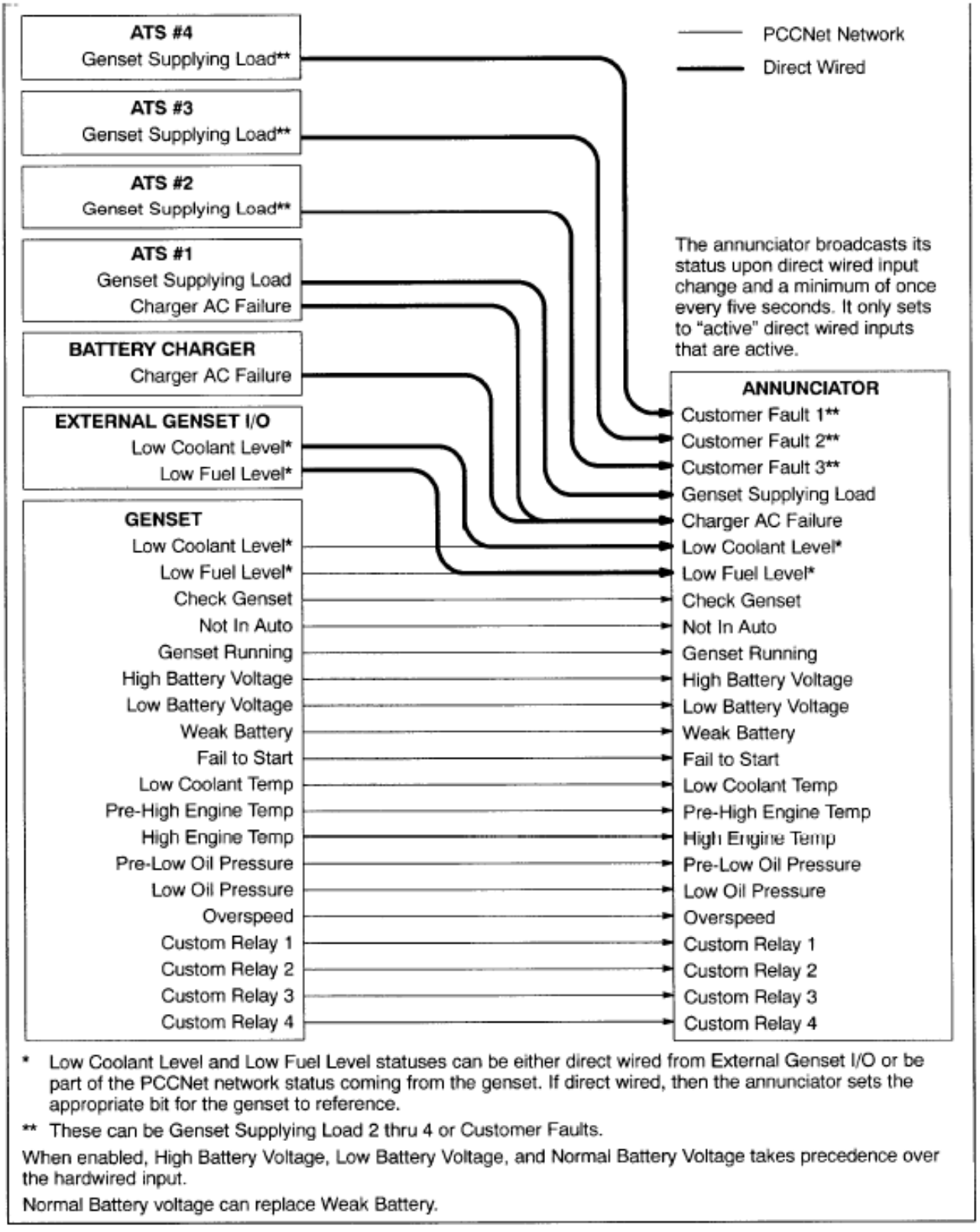
10% to 95% RH (non-condensing)

Default lamp configurations

Can be configured for current NFPA 110 standard or as a replacement for Legacy (pre-2001) NFPA 110 annunciator (300-4510 or 300 4511)

		NFPA 110		
Lamp	**Description**	**Color**	**Horn**	**Flash**
DS1	Customer fault 1	Green	No	No
DS2	Customer fault 2	Amber	No	No
DS3	Customer fault 3	Red	No	No
DS4	Genset supplying load	Amber	No	No
DS5	Charger AC failure	Amber	Yes	No
DS6	Low coolant level	Amber	Yes	No
DS7	Low fuel level	Red	Yes	No
DS8	Check generator set	Amber	No	No
DS9	Not in auto	Red	Yes	Yes
DS10	Generator set running	Amber	No	No
DS11	High battery voltage	Amber	Yes	No
DS12	Low battery voltage	Red	Yes	No
DS13	Weak battery	Red	Yes	No
DS14	Fail to start	Red	Yes	No
DS15	Low coolant temp	Red	Yes	No
DS16	Pre-high engine temp	Amber	Yes	No
DS17	High engine temp	Red	Yes	No
DS18	Pre-low oil pressure	Red	Yes	No
DS19	Low oil pressure	Red	Yes	No
DS20	Overspeed	Red	Yes	No

Typical installation



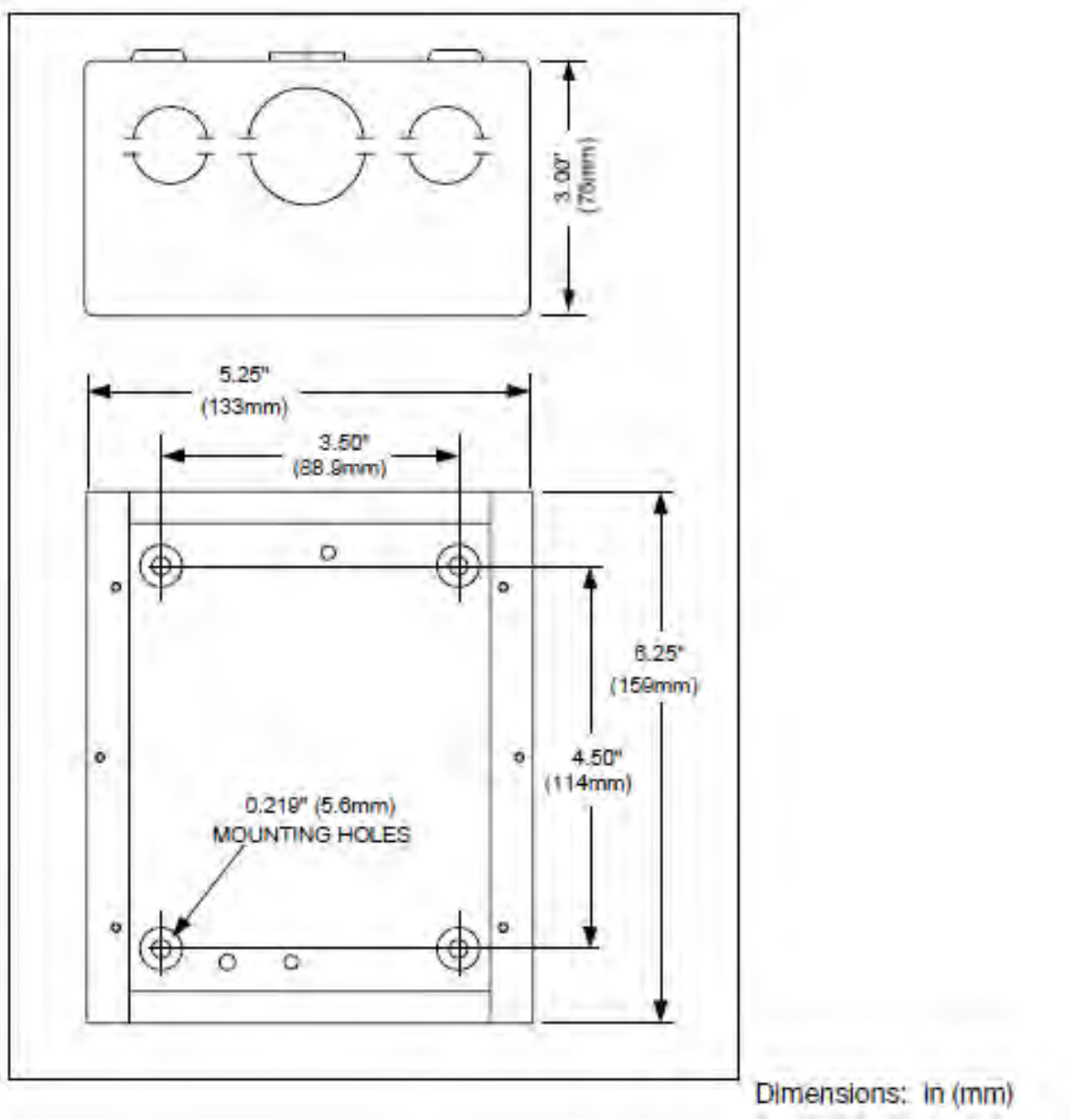
* Low Coolant Level and Low Fuel Level statuses can be either direct wired from External Genset I/O or be part of the PCCNet network status coming from the genset. If direct wired, then the annunciator sets the appropriate bit for the genset to reference.

** These can be Genset Supplying Load 2 thru 4 or Customer Faults.

When enabled, High Battery Voltage, Low Battery Voltage, and Normal Battery Voltage takes precedence over the hardwired input.

Normal Battery voltage can replace Weak Battery.

Dimensions



Ordering information

Part number	Description
0300-5929-01	Panel mount
0300-5929-02	Panel with enclosure

For more information contact your local Cummins distributor or visit power.cummins.com

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S-1472 (02/22)

Specification sheet

Oil pan heaters H479, H487, H488

120V / 150W

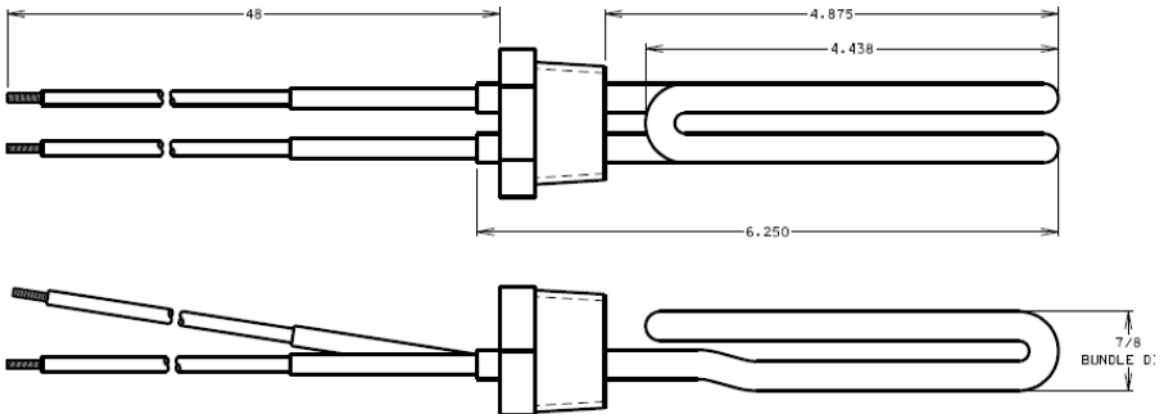
Oil pan heaters

Single phase heaters provided to keep the engine oil warm for easier starting.

Alternator heater kit	Feature	Corresponding production part	Critical component	Voltage (AC)	Wattage	Instructions
0333-0407-02	H487-2	0179-2289	0333-0407-12	120	300	N/A
0333-0407-04	H479-2	0179-2290	0333-0407-14	208/240	300	N/A
0333-0407-05	H488-2	0179-2291	0333-0407-15	480	300	N/A
0333-0407-06	H487-2	0179-2289-01	0333-0407-16	120	300	N/A
0333-0482	H487-2	0179-2283-01	0333-0429-01	120	300	000G-0140
0333-0483	H479-2	0179-2283-01	0333-0429-02	208/240	300	000G-0140

Component drawings

Component # 0333-0438-xx



Specifications:

1. Rating: 120V. 300W. 1PH
2. Heater plug: 1: NPT SA-105 Class 6000 pipe plug.
3. Element: (1) 0.315 inch diameter copper coated steel heating element.
4. Termination: 16 GA. Stranded tinned copper. 90ºC. Neoprene lead wires.
5. Nominal watt density: 17 watts per square inch.
6. Unit is UL listed per file number E52951.

Specification Sheet

Alternator Heaters A292 and A293

Alternator Heaters

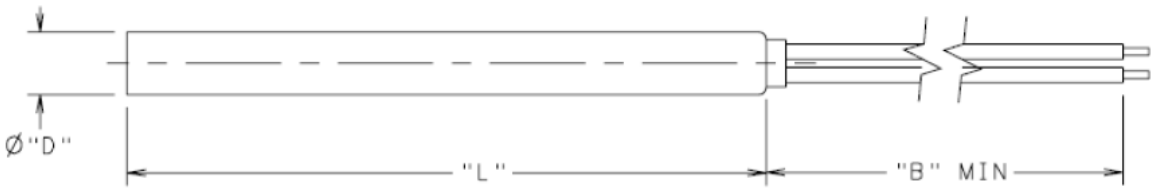
Alternator heaters help prevent corrosive damage of electrical and mechanical components in high humidity environments.

Alternator heater kit	Feature	Corresponding production part	Critical component	Voltage (AC)	Wattage	Instructions
0179-5074-02	A292-2	0179-5074-01	0333-0438-07	120	100	N/A
0300-4434	A292-2	0179-2699-01	0333-0550-01	120	100	000C-0449
0333-0443	A292-2	0179-2285-09	0333-0438-03 (qty 2)	120	150	000C-0437
0333-0444	A293-2	0179-2285-02	0333-0438-04 (qty 2)	240	150	000C-0437
0333-0445	A292-2	0179-2286-01	0333-0438-07	120	100	000C-0437
0333-0445	A292-2	0179-2667-01	0333-0438-07	120	100	000C-0437
0333-0446	A293-2	0179-2286-02	0333-0438-08	240	100	000C-0437
0333-0446	A293-2	0179-2667-02	0333-0438-08	240	100	000C-0437
0333-0447	A292-2	0179-2285-10	0333-0438-05	120	300	000C-0437
0333-0447	A292-2	0179-2285-03	0333-0438-05	120	300	000C-0437
0333-0448	A293-2	0179-2285-04	0333-0438-06	240	300	000C-0437

Component Drawings

Cartridge Heater

Component # 0333-0438-xx



Part #	Ø "D"	Dim "L"	Dim "B"
0333-0438-01	15.8	160	1200
0333-0438-02	15.8	160	1200
0333-0438-03	25.4	160	2200
0333-0438-04	25.4	160	2200
0333-0438-05	25.4	260	2200
0333-0438-06	25.4	260	2200
0333-0438-07	19	134	250
0333-0438-08	19	134	250

A 2 Year Agreement is included with 1 Inspection & 1 Full Service each year.

Power Generation System Planned Equipment Maintenance

Cummins Sales and Service

Scope of Services

INSPECTION
(MONTHLY, QUARTERLY, OR ONE-TIME PER YEAR)

Battery & Battery Charger System
- Check battery charger functions
- Cable connections, termination cleanliness and security
- Check electrolyte level, vent caps of all cells in the starting batteries
- Battery Conductance Test

Fuel System
- Inspect main tank/day tank fuel level
- Inspect day tank controls and pumps. Test operate day tank controls (where available)
- Inspect all fuel hoses, clamps, pipes, components, and fittings
- Inspect governor linkage
- Visually inspect rupture/containment basin
- Water in Fuel Test - Sub-base, day tanks
- Optional - fuel sample for laboratory analysis*

Engine Cooling System
- Inspect all hoses and clamps for leaks, coolant level and condition
- Inspect radiator cap and filler neck condition
- Inspect drive belts, observe alignment and deflection
- Observe coolant heater operations
- Utilize DCA test strip to record coolant properties
- Inspect radiator surfaces, shrouds, and barriers for obstruction
- Visually inspect low temperature after cooler coolant
- Optional –coolant sampling*

Engine & Lubrication System
- Inspect lubrication system (visually check oil level)
- Inspect crankcase ventilation system
- Inspect spark ignited ignition system

Intake/Exhaust System
- Inspect air cleaner element and entire intake system
- Inspect exhaust system and rain cap
- Inspect louver operations

Generator Controls & Power Connections
- Visually inspect all engine mounted wiring, senders, and devices
- Visually inspect all control mounted components and wiring
- Lamp test all lights and indicators
- Visually inspect breaker and power connections
- Manually operate generator main breaker(s) open and closed*

*NOTE: Will not exercise breakers or contactors on a paralleling device.

Generator Operations
- Start and observe generator and equipment operations
- Verify engine and generator safeties for proper operation
- System test with or without load

Automatic Transfer Switch
(Paralleling Switchgear, Bypass Switchgear, Manual Transfer Switches)
- Visually inspect all power and control wiring
- Visually inspect switch mechanism and enclosure
- Visually inspect controls and time delays settings
- Verify function of exercise clock

FULL SERVICE
(INCLUDES INSPECTION)

Operational & Functional Review of Generator Critical Components
- Inspect engine cooling fan & fan drives for excessive wear or shaft wobble
- Check all pulleys, belt tensioners, slack adjusters & idler pulleys for travel, wear & overall condition
- Inspect/lubricate drive bearings, gear or belt drives, lovejoy and other shaft connecting hardware

Lubrication Oil and Filtration Service
- Change engine lubrication oil
- Change primary lubrication and bypass filters
- Change fuel filters
- Post lube service operation of genset (unloaded) at rated temperature
- Optional - oil sample for laboratory analysis*

***Additional Charge**

Any additional repairs, parts or services which are required will be brought to the attention of the owner. Repairs will only be made after proper authorization from the owner is given to Cummins Sales and Service. Any additional repairs, maintenance or service performed by Cummins Sales and Service for a Planned Equipment Maintenance Agreement holder will be at current Cummins Sales and Service labor rates.

POWERCOMMAND® OTEC TRANSFER SWITCH

POWERCOMMAND® 40 CONTROL | OPEN TRANSITION | 40 A–1200 A

AUTOMATIC TRANSFER SWITCH

DESCRIPTION

The OTEC series transfer switch provides the basic features typically required for primary source and generator set monitoring, generator set starting and load transfer functions for emergency standby power applications. The are suitable for use in emergency, legally required, and optional standby circuits in commercial and light industrial applications. The OTEC transfer switch features the new PowerCommand® 40 control with a comprehensive feature list to suit a wide variety of ATS applications.

FEATURES

PowerCommand® 40-01 control – A fully featured microprocessor-based control with LCD digital display and tactile-feel soft-switches for easy operation and screen navigation. Control highlights include Modbus communication, front panel PC software configuration. Advanced features include, three phase sensing on both sources, manual restore to S1, synch check, and event logging capability. Please see the S-6560 PowerCommand® 40-01 control specification sheet for the full description, benefits and features.

Programmed transition – Open transition timing can be adjusted to completely disconnect the load from both sources for a programmed time period, as recommended by NEMA MG-1 for transfer of inductive loads.

Advanced transfer switch mechanism – Unique bi-directional linear actuator provides virtually frictionless constant force, straight-line transfer switch action during automatic operation.

Positive interlocking – Mechanical and electrical interlocking prevent source-to-source connection through the power or control wiring.

Main contacts – Heavy-duty silver alloy contacts used with multi-leaf arc chutes are rated for motor loads or total system load transfer. They require no routine contact maintenance. Continuous load current not to exceed 100% of switch rating and tungsten loads not to exceed 30% of switch rating.

Ease of service and access – Single-plug harness connection and compatible terminal markings simplify servicing. Access space is ample. Door-mounted controls are field-programmable; no special tools are required.

Complete product line – Cummins is a single source supplier with a wide range of equipment, accessories and services to suit virtually any backup power application.

Warranty and service – Products are backed by a comprehensive warranty and a worldwide network of distributors with factory-trained service technicians.

TRANSFER SWITCH MECHANISM

- Transfer switch mechanism is electrically operated and mechanically held in the Source 1 and Source 2 positions. The transfer switch incorporates electrical and mechanical interlocks to prevent inadvertent interconnection of the sources.
- Independent break-before-make action is used for both 3-pole and 4-pole simultaneously switched neutral. This design allows use of sync check operation when required, or control of the operating speed of the transfer switch for proper transfer of motor and rectifier-based loads (programmed transition feature).
- True 4-pole switching allows for proper ground (earth) fault sensing and consistent, reliable operation for the life of the transfer switch. The neutral poles of the transfer switch have the same ratings as the phase poles and are operated by a common crossbar mechanism, eliminating the possibility of incorrect neutral operation at any point in the operating cycle, or due to failure of a neutral operator.
- Electrical interlocks prevent simultaneous closing signals to normal and emergency contacts and interconnection of normal and emergency sources through the control wiring.
- High pressure silver alloy contacts resist burning and pitting. Separate arcing surfaces further protect the main contacts. Contact wear is reduced by multiple leaf arc chutes that cool and quench the arcs. Barriers separate the phases to prevent interphase flashover. A transparent protective cover allows visual inspection while inhibiting inadvertent contact with energized components.

- Switch mechanism, including contact assemblies, is UL 1008 certified to verify suitability for applications requiring high endurance switching capability for the life of the transfer switch. Withstand and closing ratings are validated using the same set of contacts, further demonstrating the robust nature of the design.

SPECIFICATIONS	
Voltage rating	Up to 600 V AC, 50 or 60 Hz.
Arc interruption	Multiple leaf arc chutes provide dependable arc interruption.
Neutral bar	A full current-rated neutral bar with lugs is standard on enclosed 3-pole transfer switches.
Auxiliary contacts	Two isolated contacts (one for each source) indicating switch position are provided for customer use. Contacts are normally open, and close to indicate connection to the source. Wired to terminal block for easy access. Rated at 10 A Continuous and 250 V AC maximum.
Operating temperature	-22 ˚F (-30 ˚C) to 140 ˚F (60 ˚C)
Storage temperature	-40 ˚F (-40 ˚C) to 140 ˚F (60 ˚C)
Humidity	Up to 95 % relative, non-condensing
Altitude	Up to 10,000 ft (3,000 m) without derating
Surge withstand ratings	Voltage surge performance and testing in compliance with the requirements of IEEE C62.41 (Category B3) and IEEE C62.45.
Total transfer time (source-to-source)	Will not exceed 6 cycles at 60 Hz with normal voltage applied to the actuator and without programmed transition enabled.
Manual operation*	Transfer switch mechanisms are equipped with means to manually transfer. All sources must be de-energized before manual operation is attempted.

**See Operator Manual for further details.*

TRANSITION MODES

Open delayed transition – In this transition mode the time required for the transfer switch to transfer between sources is adjustable so that the load-generated voltages decay to a safe level before connecting to an energized source. Recommended by NEMA MG-1 to prevent nuisance tripping breakers and load damage. Adjustable 0.5 secs-10 minutes, and default 0.5 seconds.

Open in-phase translation – Initiates open transition transfer when in-phase monitor senses both sources are in phase (voltage, phase and frequency). Operates in a break-before-make sequence. Includes ability to enable programmed transition as a backup. The module waits indefinitely for synchronization unless the 'Return to programmed transition' function is active in which case after 2 minutes it performs a programmed delayed transfer.

UL 1008 WITHSTAND AND CLOSING RATINGS (WCR)

The transfer switches listed below must be protected by circuit breakers or fuses. Referenced drawings include detailed listings of specific breakers or fuse types that must be used with the respective transfer switches. Consult with your distributor/dealer to obtain the necessary drawings. Withstand and Closing Ratings (WCR) are stated in symmetrical RMS amperes.

BREAKER PROTECTION

		MOLDED CASE CIRCUIT BREAKER (MCCB) PROTECTION				SPECIAL CIRCUIT BREAKER PROTECTION		
Frame	Amperage rating (A)	With specific manufacturers MCCB (kA at 480V)	With specific manufacturers MCCB (kA at 600V)	Max MCCB ratings (A)	Drawing reference	With specific Current limiting breakers (kA at 600V)	Max. Current limiting breakers CLB rating (A)	Drawing reference
A	40, 75, 125 (3-pole only)	14	14	225	A050J441	200	225	A048J566
	40, 75, 125 (4-pole only)	30	30	400	A048E949	200	400	A051D533
~~B~~	~~150, 225, 260~~	~~30~~	~~30~~	~~400~~	~~A048E949~~	~~200~~	~~400~~	~~A051D533~~
C	300, 400, 600	65	65	1200	A056M829	200	1200	A048J564
~~D~~	~~800, 1000~~	~~65~~	~~50~~	~~1400~~	~~A056M821~~	~~200~~	~~1400~~	~~A048J562~~
E	1200	85	65	1600	A056M825	200	1600	A048P186

FUSE PROTECTION

Frame	Amperage rating (A)	WCR with current limiting fuses (kA)	Fuse size and type	Drawing reference
A	40, 75, 125 (3 and 4-pole)	200	200 A, Class: J, RK1, RK5, T	A050J441
~~B~~	~~150, 225, 260~~	~~200~~	~~1200 A Class L or T, or 600A class J, RK1, RK5~~	~~A048E949~~
C	300, 400, 600	200	1200 A Class L or T, or 600A class J, RK1, RK5	A056M829
~~D~~	~~800, 1000~~	~~200~~	~~2000 A Class L or 1200 A Class T or 600 A Class J, RK1, RK5~~	~~A056M821~~
E	1200	200	2000 A Class L or 1200 A Class T or 600 A Class J, RK1, RK5	A056M825

**All WCR values are at 600 V*

TIME BASED RATINGS: 0.05S (3-CYCLES AT 60 HZ)

Frame	Amperage rating (A)	WCR (kA at Vmax and below)	Max. MCCB rating (A)	Drawing reference
C	300, 400, 600	25 at 600 V	1200	A056M829
~~D~~	~~800, 1000~~	~~35 at 600 V~~	~~1400~~	~~A056M821~~
E	1200	42 at 600 V	1600	A056M825

TRANSFER SWITCH LUG CAPACITIES

Frame	Amperage rating (A)	Cables per phase	Size
A	40, 70, 125 3-pole	1	#12 AWG-2/0
	40 4-pole	1	#12 AWG-2/0
	70, 125 4-pole	1	#6 AWG – 300MCM
B	150, 225	1	#6 AWG – 300MCM
	260	1	#6 AWG – 400MCM
C	300, 400	2	One accepts 3/0 AWG – 600 MCM and One #4 AWG – 250 MCM
	600	2	250 – 500 MCM
D	800, 1000	4	250 – 500 MCM
E	1200	4	#2 AWG to 600 MCM standard (feature N045) 1/0 AWG to 750 MCM optional (feature N066) Compression Lug Adapter optional (feature N032)

**All lugs 90°C rated and accept copper or aluminum wire unless indicated otherwise.*
Refer to the latest NFPA 70 Article 310 - Conductors for general wiring for the ampacity calculations.

ENCLOSURE

The transfer switch and control are wall-mounted in a key-locking enclosure. Wire bend space complies with 2017 NEC.

DIMENSIONS – TRANSFER SWITCH IN UL TYPE 1 ENCLOSURE

Frame	Amperage rating (A)	Height		Width		Depth		Weight	
		in	mm	in	mm	in	mm	lb	kg
A	40, 70, 125 3-pole	27	686	20.5	521	12	305	82	37
	40, 70, 125 4-pole	35.5	902	26	660	16	406	165	75
B	150, 225	35.5	902	26	660	16	406	165	75
	260	43.5	1105	28.5	724	16	406	170	77
C	300, 400, 600	54	1372	25.5	648	18	457	225	102
D	800, 1000	68	1727	30	762	19.5	495	360	163
E	1200	90	2286	39	991	27	698	730	331

DIMENSIONS – TRANSFER SWITCH IN UL TYPE 3R, 4, 4X, OR 12 ENCLOSURE

Frame	Amperage rating (A)	Height		Width		Depth		Weight		Cabinet Type
		in	mm	in	mm	in	mm	lb	kg	
A	40, 70, 125 3-pole	34	864	26.5	673	12.5	318	125	57	3R, 12, 4
		46	1168	32	813	16	406	255	102	4X
	40, 70, 125 4-pole	42.5	1080	30.5	775	16	406	215	97	3R, 12, 4
		46	1168	32	813	16	406	215	102	4X
B	150, 225	42.5	1080	30.5	775	16	406	1118	97	3R, 12, 4
		46	1168	32	813	16	406	255	102	4X
	260	46	1168	32	813	16	406	255	102	3R, 12, 4, 4X
C	300, 400, 600	59	1499	27.5	699	16.5	419	275	125	3R, 12, 4
		79.5	1867	32.5	826	19.5	495	410	186	4X
D	800, 1000	3.5	1867	32.5	826	19.5	495	410	186	3R, 12, 4, 4X
E	1200	90	2286	39	991	27	698	730	331	3R, 12, 4, 4X

ENCLOSURE ACCESS FOR CABLE INSTALLATION AND MAINTENANCE

All frames allow for top, side, and bottom cable entry. NEC Requires Minimum 36" Front Access. Additional front clearance is needed to remove the mechanism. Refer to the outline drawing.

OTEC DRAWING PART NUMBERS						
		Outline Drawing				
Frame	Amperage rating (A)	Type 1	Type 3R & 12	Type 4	Type 4X	Open construction
A	40, 70, 125 3-pole	0310-0544	0310-0453	0310-0445	0500-4184	A065S429
	40, 70, 125 (4-pole)	0500-4896			0500-4896	
B	150, 225	0310-0414	0310-0454	0310-0446	0500-4184	
	260	0310-0540	0310-0455	0310-0447	0500-4184	
C	300, 400, 600	0310-1307	0310-1315	0310-1316	0500-4185	
D	800, 1000	0310-0417	0310-0457	0310-0449	0500-4185	
E	1200	A065S431		A065S432		A065S430

WIRING DIAGRAM PART NUMBERS						
		Wiring Diagram				
Frame	Amperage rating (A)	Utility to Genset (120 – 480 V)	Utility to Genset (600 V)	Interconnection	Utility to Genset, Open Construction (120 – 480 V)	Utility to Genset, Open Construction (600 V)
A	40, 70, 125 3-pole	A065K034	A065H782	A065H780	A065H783	A065H784
	40, 70, 125 (4-pole)					
B	150, 225					
	260					
C	300, 400, 600					
D	800, 1000	A065H781				
E	1200					

SUBMITTAL DETAIL

Model
- 40, 70, 125 A, (3- and 4-pole)
- 150, 225, 260 A
- 300, 400, 600 A
- 800, 1000 A
- 1200 A

Poles
- A028 Poles – 3 (solid neutral)
- A029 Poles – 4 (switched neutral)

Application
- A035 Utility-to-genset

Frequency
- A044 60 Hz
- A045 50 Hz

Phase
- A041 single phase, 2-wire or 3-wire
- A042 three phase, 3-wire or 4-wire

Voltage ratings
- R020 120V
- R038 190V
- R021 208V
- R022 220V
- R023 240V
- R024 380V
- R025 416V
- R035 440 V
- R026 480 V
- R027 600 V

Enclosure
- B001 Type 1: Indoor use, provides some protection against dirt (similar to IEC type IP30)
- B002 Type 3R: Intended for outdoor use, provides some protection from dirt, rain and snow (similar to IEC type IP34)
- B003 Type 4: Indoor or outdoor use, provides some protection from wind-blown dust and water spray (similar to IEC type IP65)
- B004 open construction: no enclosure - includes automatic transfer switch and controls
- B010 Type 12: Indoor use, some protection from dust (similar to IEC type IP61).
- B025 Type 4X: Stainless steel, indoor or outdoor use, provides some protection from corrosion (similar to IEC Type IP65).

Standards
- A046 UL 1008/CSA certification
- A080 IBC seismic certification

Control voltage
- M033 12V, Genset starting voltage
- M034 24V, Genset starting voltage

Control options
- M032 Elevator signal relay
- M081 MODBUS RS485 Communication module

Auxiliary relays
- Relays are UL Listed, and factory installed. All relays provide (2) normally closed isolated contacts rated 10A @ 600 VAC. Relay terminals accept (1) 18 gauge to (2) 12-gauge wires per terminal.
- L101 24 VDC coil - installed, not wired (for customer use).
- L102 24 VDC coil - emergency position – relay energized when switch is in source 2 (emergency) position.
- L103 24 VDC coil - normal position - relay energized when switch is in source 1 (normal) position
- L201 12 VDC coil installed, not wired (for customer use)
- L202 12 VDC coil - emergency position – relay energized when switch is in source 2 (emergency) position
- L203 12 VDC coil - normal position - relay energized when switch is in source 1 (normal) position

Optional Cable Lugs
- N032 Lug adapters, compression, ½ stab (1200A only)
- N045 Cable lugs, mechanical, 600 MCM, 4 per pole (1200A only)
- N066 Cable lugs, mechanical, 750 MCM, 4 per pole (1200A only)

Miscellaneous
- C027 Cover - guard
- M003 Terminal block - 30 points (not wired)

Warranty
- G004 2-years, comprehensive
- G007 5-years, comprehensive
- G014 3-years, comprehensive
- G015 10-years, comprehensive

Shipping
- A051 Packing - export box (800 – 1000 A)

Request for quotation (RFQ)
- Z555 Nonconfigurable spec [ETO]

Accessories
- AC-170 Accessories specification sheet

CODES AND STANDARDS

UL	All switches are UL 1008 Listed with UL 50E Type Rated cabinets and UL Listed CU-AL terminals.	**NEC®**	Suitable for use in emergency, legally required and Standby and Critical Operations Power Systems (COPS) applications per NEC 700, 701, 702 and 708.
NEMA	All switches comply with NEMA ICS 10.	**ISO®**	All switches are designed and manufactured in facilities certified to ISO 9001.
CSA	All switches are certified to CSA C22.2 No. 178.1 switching of electrical energy in emergency or other systems, up to 600 VAC and 4 kA.	**IBC®**	All switches are certified to IBC 2018.
IEEE	All switches comply with IEEE 446 Recommended Practice for Emergency and Standby Power Systems.	**EMC**	Display controllers meet the following Electromagnetic Compatibility (EMC) standards: ■ EN 61000-6-2 Generic Immunity Standard for the Industrial Environment. ■ EN 61000-6-4 Generic Emission Standard for the Industrial Environment.
NFPA	All switches comply with NFPA 70, 99 and 110 (Level 1).		

For more information, please contact your local Cummins distributor or visit cummins.com

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NAS-6542-EN PD00000511 Rev. 11/21

POWERCOMMAND® 40-01 TRANSFER SWITCH CONTROL

OTEC TRANSFER SWITCHES

DESCRIPTION

The PowerCommand® 40-01 Transfer Switch Control is a sophisticated microprocessor-based control with the basic features you need for primary source and generator set monitoring, generator set starting and load transfer functions for emergency standby power applications.

The control human machine interface (HMI) includes a LCD display with tactile-feel soft-switches for easy operation and screen navigation. All data on the control can be viewed by scrolling through screens with a display scroll button. The control displays the current active fault, fault occurrences and time-ordered history of the 10 previous faults with respect to Real Time Clock Stamp and Engine Running Time.

FEATURES

Digital display – The PowerCommand® 40-01 offers a clear back-lit LCD 4-line text display, showing system status, contextual icons and warnings. The display is also equipped with 9 red and green LEDs indicating operational status.

Modbus network communication – Modbus network communications capable. Optional Modbus RTU RS485 connection (1 serial port).

Diagnostics and reporting – Detailed event logging with enhanced fault codes, alert lists, power event history, and diagnostic capability during service events and provides the ability to meet any reporting requirements.

PC & Front Panel Configurations – The modules can be easily configured using the PC software. Selected front panel editing is also available.

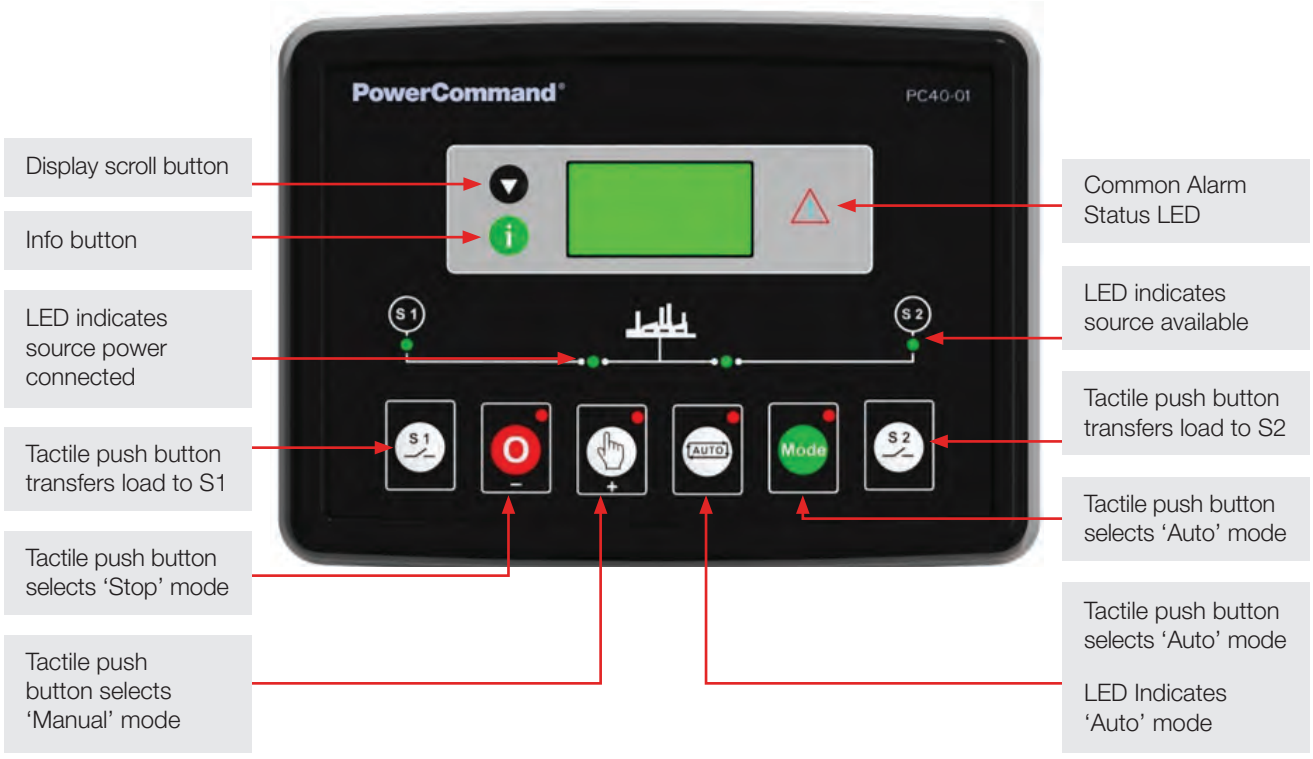
Ease of service and access – Built-in plug-and-play control with minimized point-to-point connections and compatible terminal markings simplify servicing.

Complete product line – Cummins is a single source supplier with full scope of power system solutions, integration and service capability, from parallelingto system level controls, switchgear and remote connectivity.

Warranty and service – Products are backed by a comprehensive warranty and a worldwide network of distributors with factory-trained service technicians.

Isometric (ISO) projection: front views

HUMAN MACHINE INTERFACE (HMI) CAPABILITIES



CONTROL FUNCTIONS

TRANSFER INHIBIT

When transfer inhibit external input is active, the control does not automatically transfer the transfer switch to a standby source even when the preferred source fails.

RETRANSFER INHIBIT

When retransfer inhibit external input is active, the control does not automatically retransfer the transfer switch to a preferred source even when the preferred source returns.

REAL TIME CLOCK

This feature is used by the control for fault and event time stamping and as a reference for exerciser schedules and exception schedules.

TEST – REMOTE

Test feature allows the user to automatically test the standby source and the transfer switch. The test command can be issued from the remote source.

The test has following types available:

- Remote Start On Load
- Remote Start Off Load

PREFERRED SOURCE SELECTION

Using this feature the user can swap the priority of the sources which are preferred and standby.

ELEVATOR SIGNAL

This optional feature allows an elevator connected to the system to come to a complete stop before the switch transfers.

EXERCISER SCHEDULER

The Scheduler allows the user to configure pre-set automatic starting and stopping of the Generator as well as stopping the ATS carrying out a transfer (when in Auto mode).

BANK 1 / BANK 2

Each Bank of the Exercise Scheduler is used to give up to 8 scheduled runs per bank, 16 in total. This run schedule is configurable to repeat every 7 days (weekly) or every 28 days (monthly). Do Not Transfer, Off Load and On Load. Each scheduler bank configured differently either to weekly or monthly based exercises.

SOURCE AVAILABILITY

This feature monitors the frequency and voltage sensors on the preferred and standby sources to determineand declare the availability status of the two sources, irrespective of which source is connected to the load. It declares the states as event codes. Preferred/Standby Available - active inactive.

VOLTAGE SENSING

3-phase sensing on Source 1 and Source 2 (up to 600 Vac with no need for additional PTs). Plant battery voltage monitoring.

ALPHANUMERIC DISPLAY

- S2 Voltage L1-N
- S2 Voltage L-L
- S2 Frequency
- S1 Voltage L1-N
- S1 Voltage L-L
- S1 Frequency
- Battery voltage
- Current alarms with icons
- Event log
- Scheduler
- About

TIME DELAYS

The following adjustable time delays are built into the transfer switch control. External modules to accomplish these delays are not required.

- **Start Delay** (Also known as Time Delay Engine Start, TDES adjustable from 0 to 10 hours)
- **Warming** (Also known as Time Delay Normal to Emergency, TDNE adjustable from 0 to 1 hour)
- **Elevator Delay** (Also known as Time Delay Elevator, TDEL adjustable from 0 to 5 minutes)
- **Non-sync Transfer Time** (Also known as Time Delay Programmed Transition, TDPT adjustable from 0.5 s to 10 minutes)
- **Return Delay** (Also known as Time Delay Emergency to Normal, TDEN adjustable from 0 to 5 hours)
- **Cooling** (Also known as Time Delay Engine Cool-down, TDEC adjustable from 0 to 1 hour)

LED INDICATOR LIGHTS

- Auto mode (RED)
- Auto with manual return to utility mode (RED)
- Test without load (RED)
- Test with load (RED)
- Source 1 available (GREEN)
- Source 2 available (GREEN)
- Source 1 connected to load (GREEN)
- Source 2 connected to load (GREEN)

EVENT LOG

The control displays information on up to 10 events displayed in chronological order, beginning with the most recent event, about either source. The event information shall include the following:

- Failure modes
- Warning
- Tests and exercises
- User-driven inputs (e.g., override, transfer inhibit)

SUPPORTED APPLICATIONS

APPLICATION TYPES

- Utility - Generator Set

COMMUNICATIONS

The PowerCommand® 40-01 Transfer Switch Control features an optional network communication module.

Features include:

- Optional Modbus® RTU RS485 communication module (1 isolated serial port)
- USB port for service tool interface

PROTECTION

PHASE ROTATION SENSING

- Source 1 and Source 2

UNDER-VOLTAGE SENSING

- 3-phase normal, 3-phase emergency
- Accuracy: ±2 % of full-scale phase to phase
- Phase to neutral voltage range 50Vac to 414Vac.
- Phase to phase voltage range 86Vac to 717Vac.

OVERVOLTAGE SENSING

- 3-phase normal, 3-phase emergency
- Accuracy: ±2 % of full-scale phase to phase
- Phase to neutral voltage range 52Vac to 416Vac.
- Phase to phase voltage range 90Vac to 720Vac.

OVER/UNDER FREQUENCY SENSING

- Normal and emergency
- Accuracy: ±0.2 Hz
- Frequency range 3.5 – 75 Hz

SYNC CHECK

- For in-phase transfer

ENVIRONMENT	
Operating Temperature Range	Control operates over an ambient temperature range: -30 ºC to 70 ºC.
Storage Temperature Range	The control operates after being exposed to Storage Temperatures in the range of -40 ºC to 85ºC.
Ingress Protection	The front panel is to be IP65.

CODES AND STANDARDS			
c UL us	The PC40-01 control is a UL Recognized Component Marked for United States and Canada.	NFPA	Capable of being used on systems compliant with NFPA 70, 99 and 110 (Level 1).
IEEE	The control is IEEE C37.90.2 certified. Capable of being used on IEEE 446 compliant systems; Recommended Practice for Emergency and Standby Power Systems.	NEMA	Control and display as installed in a transfer switch enclosure comply with NEMA 4X and IP65 at the transfer switch level - if the transfer switch enclosure is also NEMA 4X & IP65 compliant.
RoHS	The control is RoHS compliant.	**NEC®**	Capable of being used on systems suitable for use in emergency, legally required and Standby and Critical Operations Power Systems (COPS) applications per NEC 700, 701, 702 and 708.
CE	Fulfills the requirements of relevant European product directives.	**LVD**	The unit is designed to comply with European directive 72/23/EEC by complying with harmonized European safety standard BS EN 60950.
EMC	The control is tested to meet the following CE Electromagnetic Compatibility (EMC) standards for EN 61000 series (electromagnetic compatibility): EN 61000-6-2 Generic Immunity Standard EN 61000-6-4 Generic Emissions		

For more information, please contact your local Cummins distributor or visit cummins.com

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Bulletin XXXXXXX Produced in U.S.A. Rev. 10/21

Limited Standby 5 Year or 2,500 Hour Parts + Labor + Travel Extended Warranty – L189

Commercial Generating Set

When purchased, this limited extended warranty applies to all Cummins Power Generation® branded commercial generating sets and associated accessories (hereinafter referred to as "Product").

This warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Warranty Period:

The warranty start date is the date of initial start up, first rental, demonstration or 18 months after factory ship date, whichever is sooner. The coverage duration is 5 years from warranty start date or 2,500 hours, whichever occurs first.

Emergency Standby Power (ESP) is defined as the maximum power available during a variable electrical power sequence, under the stated operating conditions, for which a generating set is capable of delivering in the event of a utility power outage. The permissible average power output over 24 hours of operation shall not exceed 70% of the ESP.

Cummins Power Generation® Responsibilities:

In the event of a failure of the Product during the extended warranty period due to defects in material or workmanship, Cummins Power Generation® will only be responsible for the following costs:

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location.
- Maintenance items that are contaminated or damaged by a warrantable failure.

Owner Responsibilities:

The owner will be responsible for the following:

- Notifying Cummins Power Generation® distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins Power Generation®'s published policies and guidelines.
- Providing evidence for date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.

In addition, the owner will be responsible for:

- Incremental costs and expenses associated with Product removal and reinstallation resulting from non-standard installations.
- Costs associated with rental of generating sets used to replace the Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

Limitations:

This limited extended warranty does not cover Product failures resulting from:

- Inappropriate use relative to designated power rating.
- Inappropriate use relative to application guidelines.
- Failures due to normal wear, corrosion, varnished fuel system parts, lack of reasonable and necessary maintenance, unauthorized modifications and/or repair, and use of add-on or modified parts.
- Improper and/or unauthorized installation.
- Owner's or operator's negligence, accidents or misuse.
- Noncompliance with any Cummins Power Generation® published guideline or policy.
- Use of improper or contaminated fuels, coolants or lubricants.
- Improper storage before and after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.
- Replacement parts and accessories not authorized by Cummins Power Generation®.
- Use of Battle Short Mode

Limitations Continued:

- Owner or operator abuse or neglect such as: operation without adequate coolant or lubricants; overfueling; overspeeding; lack of maintenance to lubricating, cooling or air intake systems; late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices, or for progressive damage resulting from a defective shutdown or warning device.
- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the generating set.

This limited extended warranty does not cover costs resulting from:

- Difficulty in gaining access to the Product.
- Damage to customer property.
- Repair of cosmetic damage to enclosures.

Items not covered by this limited extended warranty:

- Batteries
- Enclosures
- Coolant heaters
- Exhaust systems and aftertreatment components
- Maintenance items

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CUMMINS POWER GENERATION® RIGHT TO FAILED COMPONENTS:

Failed components claimed under warranty remain the property of Cummins Power Generation®. Cummins Power Generation® has the right to reclaim any failed component that has been replaced under warranty.

THE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS POWER GENERATION ® IN REGARD TO THE PRODUCT. CUMMINS POWER GENERATION® MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT IS CUMMINS POWER GENERATION® LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This limited extended warranty shall be enforced to the maximum extent permitted by applicable law. This limited extended warranty gives the owner specific rights that may vary from state to state or from jurisdiction to jurisdiction.

Product Model Number:_____

Product Serial Number:_____

Date in Service:_____

Power Electronics
Extended Warranty Statements

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Cummins Power Generation

Power Electronics Extended Warranty Statements

Feature Codes
G004
G006
G007
G008
G013

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Power Generation

Limited 5 Year Comprehensive Extended Warranty – G007

Transfer Switch and Paralleling Systems

When purchased, this limited extended warranty applies to all Cummins Power Generation® branded Transfer Switches, Paralleling Systems and associated accessories (hereinafter referred to as "Product").

This limited extended warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Warranty Period:

The limited extended warranty start date is the date of commissioning†, demonstration or 18 months after factory ship date, whichever is sooner. The coverage duration is 5 years from warranty start date.

† Date of commissioning not to exceed date of Generator Set initial start-up.

Cummins Power Generation® Responsibilities:

In the event of a failure of the Product during the limited extended warranty period due to defects in material or workmanship, Cummins Power Generation® will only be responsible for the following costs:

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location.

Owner Responsibilities:

The owner will be responsible for the following:

- Notifying Cummins Power Generation® distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins Power Generation®'s published policies and guidelines.
- Providing evidence for date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.

In addition, the owner will be responsible for:

- Incremental costs and expenses associated with Product removal and reinstallation resulting from non-standard installations.
- Costs associated with rental of power generating equipment used to replace the Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

Limitations:

This limited extended warranty does not cover Product failures resulting from:

- Inappropriate use relative to designated power rating.
- Inappropriate use relative to application guidelines.
- Non-conformance to applicable industry standards for installation
- Normal wear and tear.
- Improper and/or unauthorized installation.
- Owner's or operator's negligence, accidents or misuse.
- Lack of maintenance or unauthorized repair.
- Noncompliance with any Cummins Power Generation® published guideline or policy.
- Improper storage before and after commissioning.
- Owner's delay in making Product available after notification of potential Product problem.

- Use of steel enclosures within 60 miles of the coast of salt water when aluminum or an alternate non-corrosive material enclosure option is available.
- Replacement parts and accessories not authorized by Cummins Power Generation®.
- Owner or operator abuse or neglect such as: late servicing and maintenance and improper storage.
- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the transfer switch or paralleling system.

This limited extended warranty does not cover costs resulting from:

- Difficulty in gaining access to the Product.
- Repair of cosmetic damage to enclosures.

CUMMINS POWER GENERATION® RIGHT TO FAILED COMPONENTS:
Failed components claimed under warranty remain the property of Cummins Power Generation®. Cummins Power Generation® has the right to reclaim any failed component that has been replaced under warranty.

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THE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS POWER GENERATION ® IN REGARD TO THE PRODUCT. CUMMINS POWER GENERATION® MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

IN NO EVENT IS CUMMINS POWER GENERATION® LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This limited extended warranty shall be enforced to the maximum extent permitted by applicable law. This limited warranty gives the owner specific rights that may vary from state to state or from jurisdiction to jurisdiction.

Product Model Number:_____

Product Serial Number:_____

Date in Service:_____

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-159499	A	1	PRODUCTION RELEASE	DAH	DAH	JAWALE	11FEB16

SEISMIC INSTALLATIONS NOTES:

1. THE DESIGN OF POST-INSTALLED ANCHORS IN CONCRETE USED FOR THE COMPONENT ANCHORAGE IS PRE-QUALIFIED FOR SEISMIC APPLICATIONS IN ACCORDANCE WITH "ACI 355.2-07" AND DOCUMENTED IN A REPORT BY A REPUTABLE TESTING AGENCY. (EX. THE EVALUATION SERVICE REPORT ISSUED BY THE INTERNATIONAL CODE COUNCIL)

2. ANCHORS MUST BE INSTALLED TO AN EMBEDMENT DEPTH AS RECOMMENDED IN THE PRE-QUALIFICATION TEST REPORT AS DEFINED IN NOTE 1. FOR "CBC 2013" APPLICATIONS.

3. ANCHORS MUST BE INSTALLED IN MINIMUM 3000 PSI COMPRESSIVE STRENGTH NORMAL WEIGHT STRUCTURAL CONCRETE. CONCRETE AGGREGATE MUST COMPLY WITH "ASTM C33".

4. ANCHORS MUST BE INSTALLED TO THE TORQUE SPECIFICATION AS RECOMMENDED BY THE ANCHOR MANUFACTURER.

5. ANCHORS MUST BE INSTALLED IN LOCATIONS SPECIFIED ON THIS INSTALLATION DRAWING.

6. WASHERS MUST BE INSTALLED AT EACH ANCHOR LOCATION BETWEEN THE ANCHOR HEAD AND EQUIPMENT FOR TENSION LOAD DISTRIBUTION. WASHERS MUST BE TYPE A OR B PLAIN WASHERS MEETING ASME B18.21.1-2009. WASHER SIZE TO MATCH ANCHOR DIAMETER.

7. CONCRETE FLOOR SLAB AND CONCRETE HOUSEKEEPING PADS MUST BE DESIGNED FOR SEISMIC APPLICATIONS IN ACCORDANCE WITH "ACI 318-11".

8. ALL HOUSEKEEPING PAD THICKNESSES MUST BE DESIGNED IN ACCORDANCE WITH THE PRE-QUALIFICATION TEST REPORT AS DEFINED IN NOTE 1 OR A MINIMUM OF 1.5X THE ANCHOR EMBEDMENT DEPTH, WHICHEVER IS LARGEST (UNLESS NOTED OTHERWISE).

9. ALL HOUSEKEEPING PADS MUST BE DOWELLED OR CAST INTO THE BUILDING STRUCTURAL FLOOR SLAB AND DESIGNED FOR SEISMIC APPLICATION PER "ACI 318-11" AND AS APPROVED BY THE STRUCTURAL ENGINEER OF RECORD.

10. FLOOR MOUNTED EQUIPMENT (WITH OR WITHOUT A HOUSEKEEPING PAD) MUST BE INSTALLED TO A STEEL REINFORCED STRUCTURAL CONCRETE FLOOR THAT IS SEISMICALLY DESIGNED AND APPROVED BY THE ENGINEER OF RECORD TO RESIST ALL LOADS FROM EQUIPMENT BEING ANCHORED TO THE FLOOR.

11. COORDINATE REINFORCEMENT OF SUPPORT STRUCTURE WITH EQUIPMENT ANCHOR LOCATIONS.

12. ATTACHING SEISMIC CERTIFIED EQUIPMENT TO FLOOR OTHER THAN THOSE DESIGNED TO ACCEPT THE SEISMIC LOADS FROM CERTIFIED EQUIPMENT BY THE STRUCTURAL ENGINEER OF RECORD IS PROHIBITED.

13. INSTALLATION ONTO A STEEL ROOF STRUCTURE OR MANUFACTURED STEEL CURB SHALL BE COORDINATED WITH THE STRUCTURAL ENGINEER OF RECORD.

14. CONNECTIONS TO THE EQUIPMENT, INCLUDING BUT NOT LIMITED TO CONDUIT, WIRING FROM CABLE TRAYS, OTHER ELECTRICAL SERVICES OR OTHER CONNECTIONS, ARE THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR AND BEYOND THE SCOPE OF THIS DOCUMENT. FLEXIBLE ATTACHMENTS MUST BE USED FOR SEISMIC CONNECTIONS TO ISOLATED COMPONENTS OR ISOLATED EQUIPMENT. THE FLEXIBLE ATTACHMENT MUST PROVIDE FOR ENOUGH RELATIVE DISPLACEMENT TO REMAIN CONNECTED TO THE EQUIPMENT AND FUNCTIONAL DURING AND AFTER A SEISMIC EVENT.

15. REFER TO GENSET OUTLINE DRAWINGS FOR WEIGHT, CG AND CONFIGURATION SPECIFICS.

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS
DIM: X ±1 | .X ±0.8 | .XX±0.38
HOLE: 0.00- 4.99 +0.15/-0.08 | 5.00- 9.99 +0.20/-0.10 | 10.00-17.49 +0.25/-0.13 | 17.50-24.99 +0.30/-0.13
ANG TOL: ± 1.0° | SCALE: 1/1

SIM TO A051N157
DO NOT SCALE PRINT
- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP

DWN D HOFMEISTER
CKD D HOFMEISTER
APVD M. JAWALE
DATE 11FEB16
FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994
FIRST USED ON ARROW
SITE CODE PGF

CUMMINS POWER GENERATION
INSTALLATION, GENSET
SEISMIC REQUIREMENTS
DWG SIZE D | A054T597 | SHEET 1 of 5 | DWG REV A

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-159499	A	1	PRODUCTION RELEASE.	DAH	DAH	JAWALE	11FEB16

GRADE MOUNTED GENERATOR SETS

CUMMINS GENSET MODEL	CONFIGURATION	ATTACHMENT TO CONCRETE					
		EVALUATION PARAMETERS	CONCRETE ANCHORS	ANCHOR EMBEDMENT	ANCHOR SPACING	DISTANCE TO NEAREST EDGE	CONCRETE SLAB THICKNESS
C50 D6C C60 D6C C80 D6C C100 D6C C125 D6C	GENERATOR SET WITH OR WITHOUT ENCLOSURE	CBC 2013/IBC 2012 Sds <= 2.5 Ip <= 1.5 ap/Rp <= 2.5/2.0 z/h = 1.0 Ω = 2.5	SEE NOTE				

NOTE: TYPE OF ANCHOR, ANCHOR ATTACHMENT SPECIFICS AND MINIMUM SLAB THICKNESS TO BE DESIGNED BY ENGINEER OF RECORD.

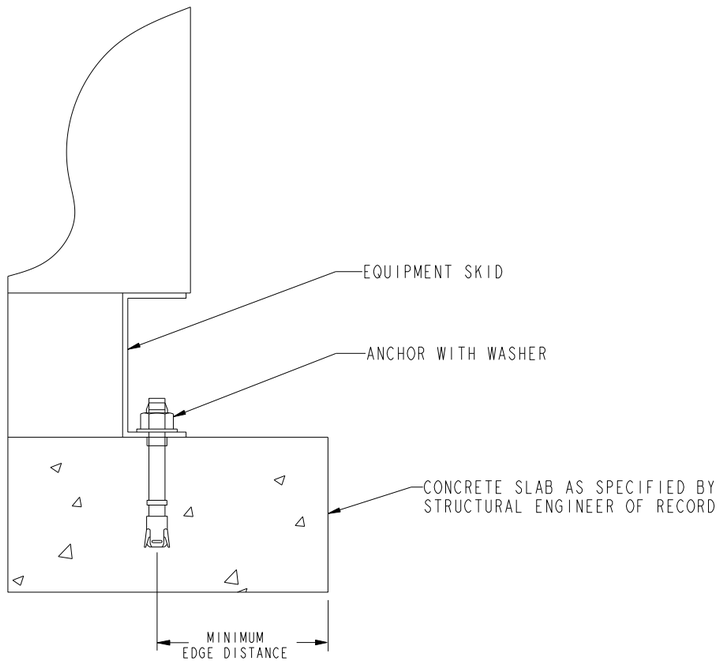
GRADE/ROOF MOUNTED GENERATOR SETS

CUMMINS GENSET MODEL	CONFIGURATION	ATTACHMENT TO STEEL	
		EVALUATION PARAMETERS	STEEL BOLTS
C50 D6C C60 D6C C80 D6C C100 D6C C125 D6C	GENERATOR SET WITH OR WITHOUT ENCLOSURE	CBC 2013/IBC 2012 Sds <= 2.5 Ip <= 1.5 ap/Rp <= 2.5/2.0 z/h <= 1.0	(QTY 4) 5/8" DIAMETER ASTM A325N OR A490 BOLTS WITH WASHERS THROUGH THE BASE RAIL MOUNTING HOLES.

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS
DIM: X ±1, .X ±0.8, .XX± 0.38
HOLE: 0.00- 4.99 +0.15/-0.08, 5.00- 9.99 +0.20/-0.10, 10.00-17.49 +0.25/-0.13, 17.50-24.99 +0.30/-0.13
ANG TOL: ± 1.0° SCALE: 1/1
SIM TO A051N157
DO NOT SCALE PRINT
- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP
DWN D HOFMEISTER
CKD D HOFMEISTER
APVD M. JAWALE
DATE 11FEB16
FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994
FIRST USED ON ARROW
SITE CODE PGF
CUMMINS POWER GENERATION
INSTALLATION, GENSET
SEISMIC REQUIREMENTS
DWG SIZE D A054T597 SHEET 2 of 5 DWG REV A

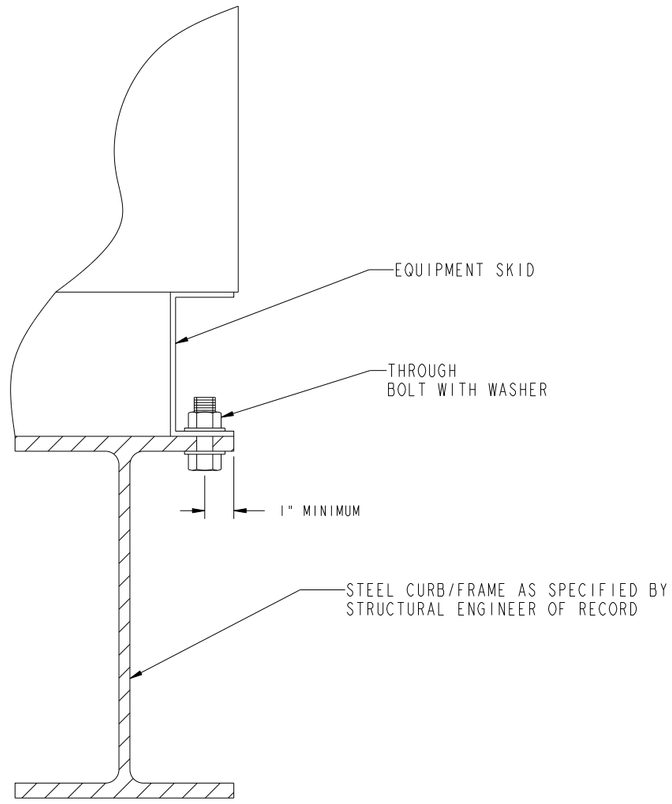
PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-159499	A	1	PRODUCTION RELEASE	DAH	DAH	JAWALE	11FEB16



TO BE DESIGNED BY ENGINEER OF RECORD

CONCRETE CONNECTION



STEEL CONNECTION

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS
DIM: X ± 1; .X ± 0.8; .XX ± 0.38
HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13
ANG TOL: ± 1.0° SCALE: 1/1

SIM TO A051N157
DO NOT SCALE PRINT
- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP

DWN D HOFMEISTER
CKD D HOFMEISTER
APVD M. JAWALE
DATE 11FEB16
FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994
FIRST USED ON ARROW

SITE CODE PGF

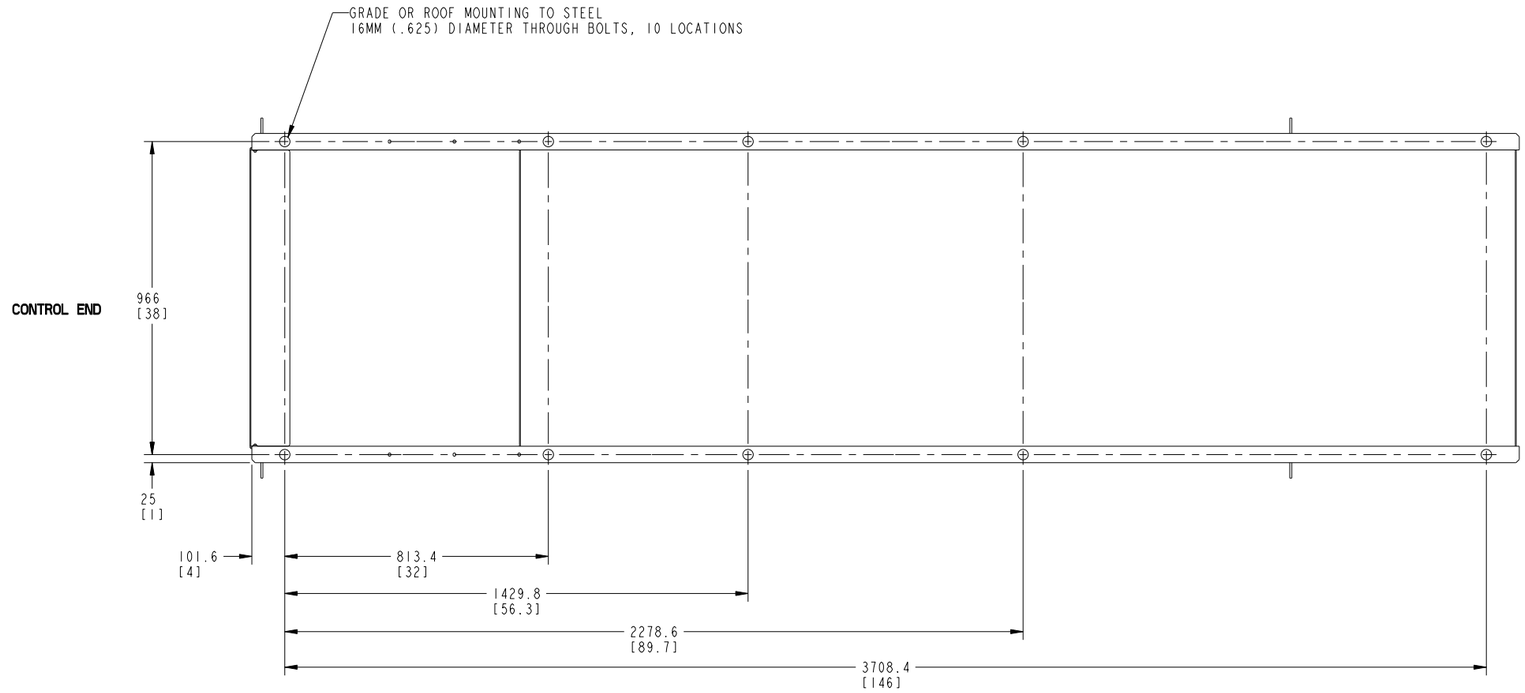
CUMMINS POWER GENERATION
INSTALLATION, GENSET
SEISMIC REQUIREMENTS
SIZE D | DWG A054T597 | SHEET 4 of 5 | DWG REV A

Regulatory Review and Approval is required prior to changing this item per PGG 1-01-01-116. This item impacts compliance with these External Regulations: IBC,OSHPD

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DWN	CKD	APVD	DATE
ECO-159499	A	1	PRODUCTION RELEASE	DAH	DAH	JAWALE	11FEB16

MOUNTING HOLE LOCATIONS FOR FUEL TANK WITH 10 BOLTS TO MOUNTING STRUCTURE

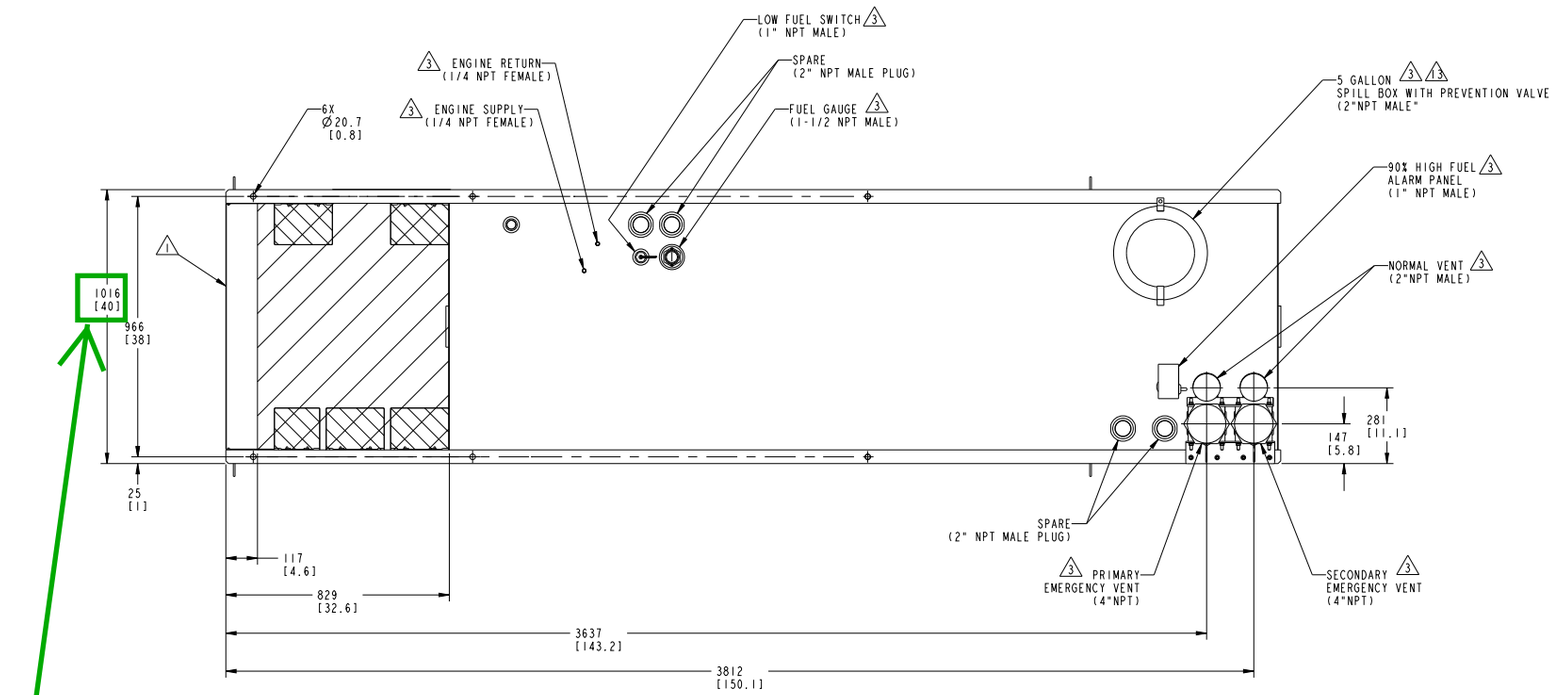


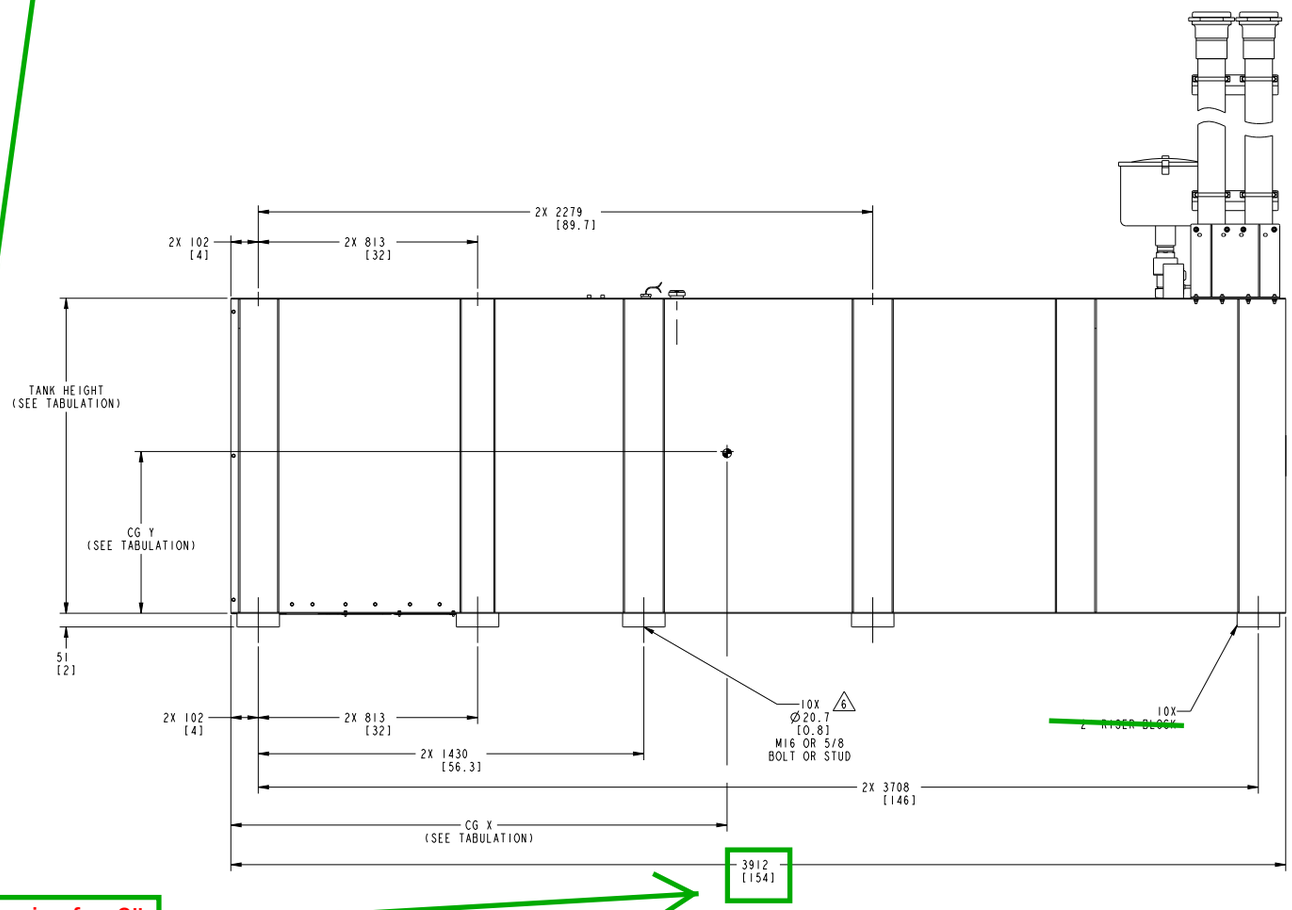
C50 D6C, C60 D6C, C80 D6C, C100 D6C, C125 D6C: FUEL TANKS WITH 10 HOLE ATTACHMENTS

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS	SIM TO A051N157	DWN D HOFMEISTER		CUMMINS POWER GENERATION		
DIM: X ± 1, .X ± 0.8, .XX± 0.38 — HOLE: 0.00- 4.99 +0.15/-0.08, 5.00- 9.99 +0.20/-0.10, 10.00-17.49 +0.25/-0.13, 17.50-24.99 +0.30/-0.13	DO NOT SCALE PRINT	CKD D HOFMEISTER		INSTALLATION, GENSET		
		APVD M. JAWALE		SEISMIC REQUIREMENTS		
		DATE 11FEB16				
ANG TOL: ± 1.0° SCALE: 1/1	- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994	FIRST USED ON ARROW	SITE CODE PGF	DWG SIZE D A054T597	SHEET 5 of 5 DWG REV A

PTC® Creo® Parametric

REL NO	REV	NO	REVISION	DRN	CKD	APVD	DATE
ECO-173968	C	1	ADD SHEET 4	CJF	MF	M WINGFIELD	06DEC17
		2	ZONE A-2: 558.8 [22] WAS 457 [18]	CJF	MF	M WINGFIELD	06DEC17
		3	ZONE A-2: 812.8 [32] WAS 762 [30]	CJF	MF	M WINGFIELD	06DEC17
		4	ADD FLAG NOTE 14	CJF	MF	M WINGFIELD	06DEC17
		5	SEE SHEET 2	CJF	MF	M WINGFIELD	06DEC17
		6	SEE SHEET 2	CJF	MF	M WINGFIELD	06DEC17





Add 12" min. for 6" min. pad reveal

NOTES:

1. TANKS ARE UL142 LISTED. SECONDARY CONTAINMENT FUEL TANK. REFER TO TANK LABELS AND LOCAL CODE TO DETERMINE VENTING REQUIREMENTS FOR BOTH COMPARTMENTS.
2. SUBBASE FUEL TANK MOUNTING. EXCESSIVE TWISTING OF THE FUEL TANK, MAY RESULT IN STRUCTURAL FAILURE OF THE TANK. TO ENSURE THE INSTALLATION DOES NOT EXCESSIVELY TWIST THE FUEL TANK, THE FOLLOWING PROCEDURE MUST BE OBSERVED:
   - 2.1 REFER TO APPLICATION MANUAL T030 FOR GENERAL SET MOUNTING GUIDELINES.
   - 2.2 AFTER PLACING SET ON FOUNDATION, VERIFY ALL SIX MOUNTING PADS CONTACT FOUNDATION.
   - 2.3 THERE ARE SHIMS ATTACHED TO EACH FUEL TANK. THESE ARE INTENDED TO FILL ANY GAP BETWEEN THE MOUNTING PADS AND FOUNDATION.
   - 2.4 INSERT THE MAXIMUM HEIGHT STACK OF SHIMS THAT WILL SLIDE INTO THE GAP.
   - 2.5 TIGHTEN TANK HOLD DOWN MOUNTING FASTENERS.
3. INDICATES PIPE SIZE OF FEATURE OR OPTION INDICATED.
4. DIMENSIONS IN [ ] ARE IN INCHES.
5. FOR IBC SEISMIC CERTIFIED INSTALLATIONS, SEE GENSET IBC SEISMIC INSTALLATION REQUIREMENTS DRAWING.
6. FUEL TANK HAS A FLANGE THICKNESS OF UP TO 10 mm [0.394 in], ALLOW EXTRA LENGTH ON HARDWARE FOR UNEVENESS OF MOUNTING SURFACE. RISER FEATURE WILL ADD ADDITIONAL 51 mm [2 in].
7. FUEL TANK PERIMETER IS SHOWN. FOUNDATION SHOULD BE EXTENDED BEYOND THIS PERIMETER. SEE (T030) APPLICATION MANUAL - (SEE SHEET 4).
8. INSTALLATION & REMOVAL LIFTING AND SERVICE ACCESS CLEARANCE (SUGGESTED MINIMUM) - (SEE SHEET 4).
9. REMOVABLE STUB-UP ACCESS PANEL.
10. ELECTRICAL STUB-UP AREA WITH FUEL TANK RISER FEATURE INSTALLED - (SEE SHEET 4).
11. MAINTAIN MIN 51 mm [2 in] CLEARANCE ABOVE E-VENT - (SEE SHEET 2).
12. WEIGHT AND CENTER OF GRAVITY INFORMATION IS ESTIMATED AND CHANGES WITH TANK FEATURE INSTALLATION.
13. FILL CAP LOCATED HERE IF OVERFILL PREVENSTION VALVE IS NOT INSTALLED.
14. EMERGENCY VENT EXTENSIONS ON SHEET 2 COME WITH OPTIONAL FEATURE C315-2 OR WITH FEATURE L196-2 (CSA), L224-2 (IBC), OR L225-2 (OSHPD).

GENSET MODEL APPLICATION	TANK FEATURE CODE/RUN TIME			
	C301-2	C303-2	C305-2	C307-2
	24 HR	48 HR	72 HR	96 HR
C50 D6C	A053L909	A053L911	A053L911	A053L912
C60 D6C	A053L909	A053L911	A053L912	A053L912
C80 D6C	A053L909	A053L911	A053L912	-
C100 D6C	A053L909	A053L911	A053L912	-
C125 D6C	A053L909	A053L912	-	-

TABULATION

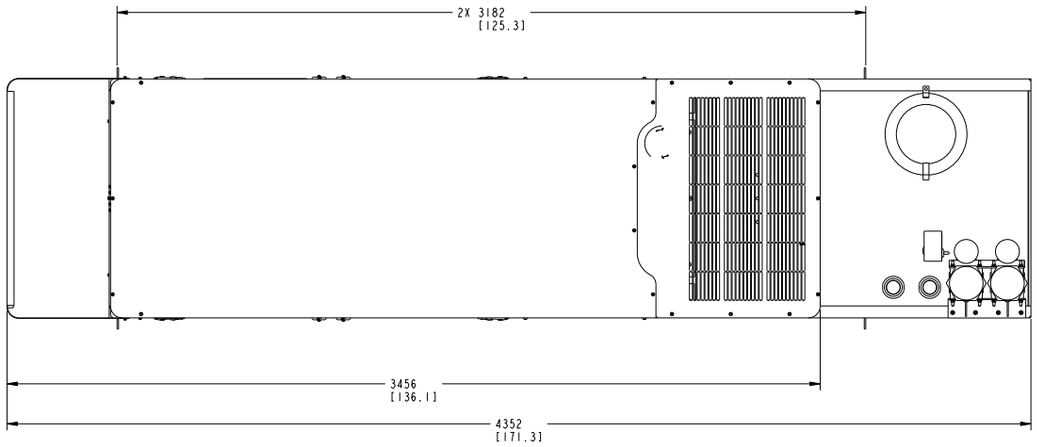
TANK NUMBER	TANK HEIGHT	VENT EXTN. HEIGHT	TANK VOLUME-LITER [GAL]		WEIGHT - kg [lb]		CG_X		CG_Y	
			TOTAL (EST)	USABLE	MIN	MAX	MIN	MAX	MIN	MAX
A053L909	558.8 [22]	3082 [121]	1038 [274]	948 [250]	607 [1388]	1413 [3113]	2170 [85]	2284 [90]	283 [11.2]	252 [9.9]
A053L911	812.8 [32]	3082 [121]	1616 [427]	1611 [425]	952 [2096]	2722 [6015]	2170 [85]	2284 [90]	411 [16.2]	392 [15.4]
A053L912	1168 [46]	3082 [121]	2422 [639]	2369 [625]	952 [2096]	2966 [6534]	2170 [85]	2284 [90]	588 [23.1]	585 [23.0]

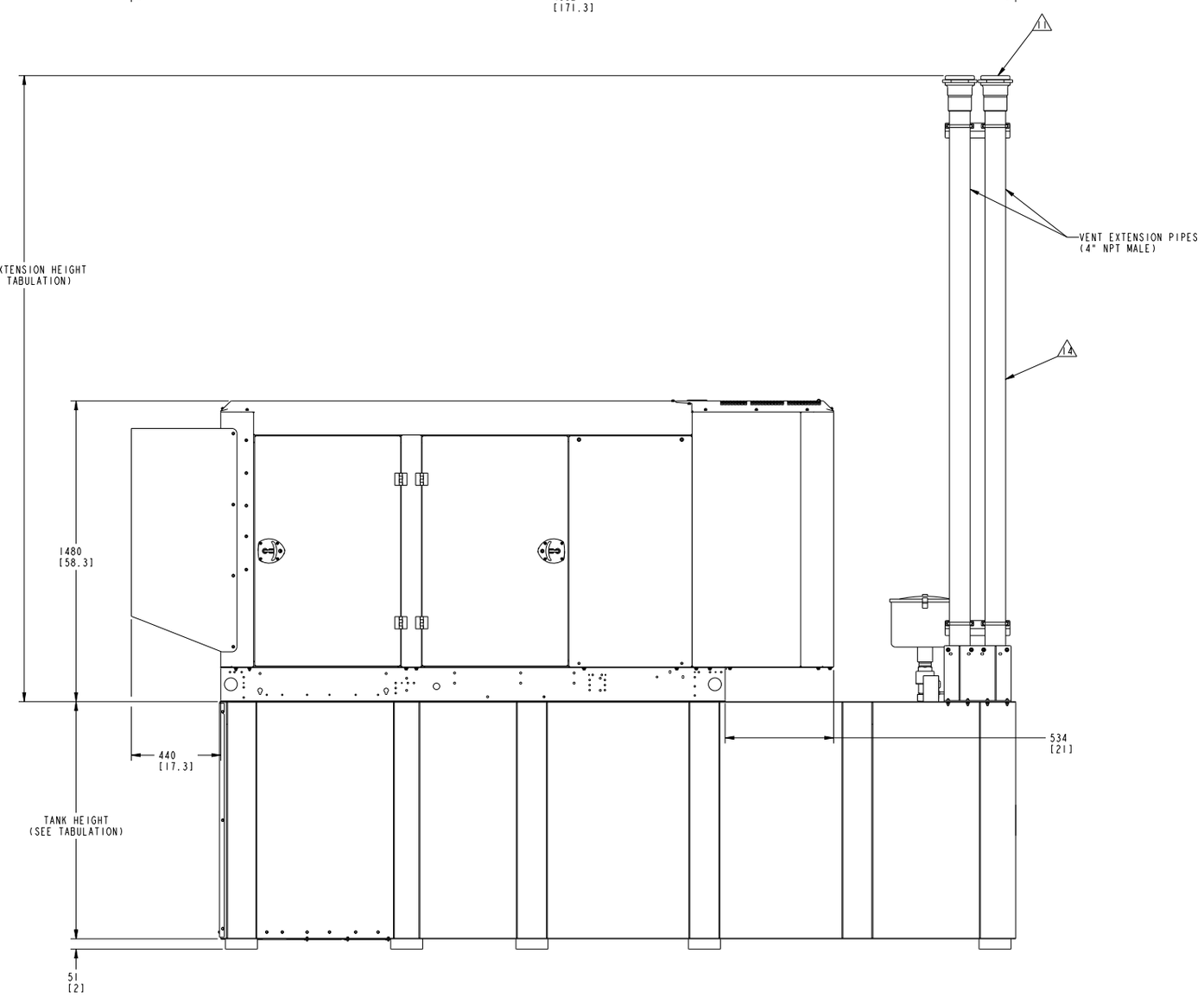
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS
SURFACE FINISH
DO NOT SCALE PRINT
DIM: X ±1, .X ±0.8, .XX± 0.38
ANG TOL ± 1.0°
SCALE 1:8
DECIMAL: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13

DRN D HOFMEISTER
CKD D HOFMEISTER
APVD M JAWALE
DATE 01FEB16
FIRST USED ON ARROW
CUMMINS POWER GENERATION
OUTLINE, TANK
REGIONAL
SITE CODE PGF
SIZE E
A054B564
CAD SHEET 1 of 4

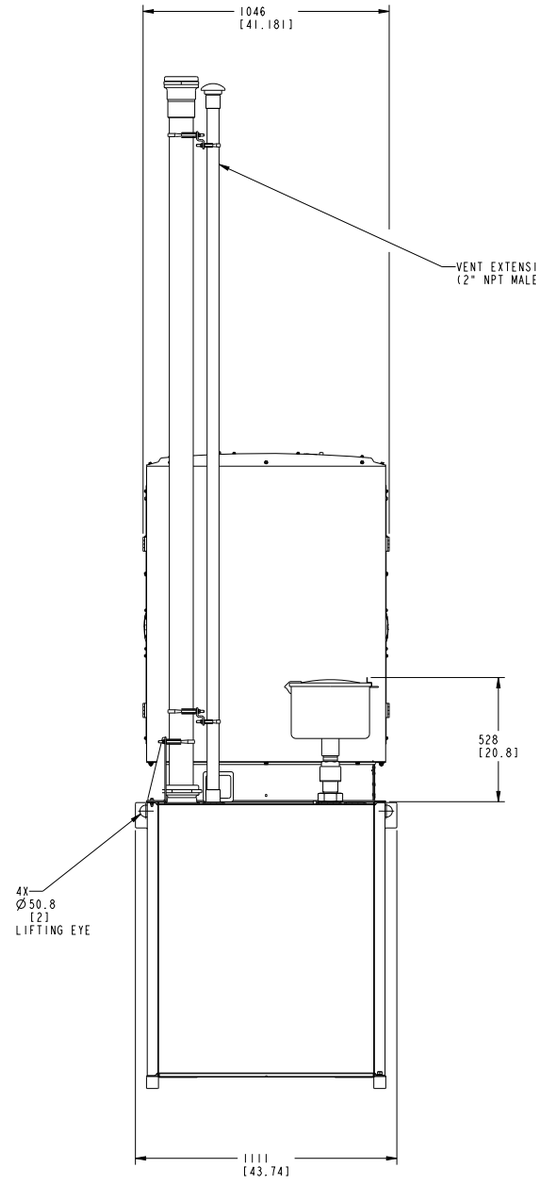
PTC® Creo® Parametric

REL NO	REV	NO	REVISION	DRN	CKD	APVD	DATE
ECO-173968	C	5	ZONE C-2: ADD FLAG NOTE 14 CALL OUT	CJF	MF	M WINGFIELD	06DEC17
		6	ZONE A-3: ADD NOTE "(WITH---EXTENSIONS)"	CJF	MF	M WINGFIELD	06DEC17





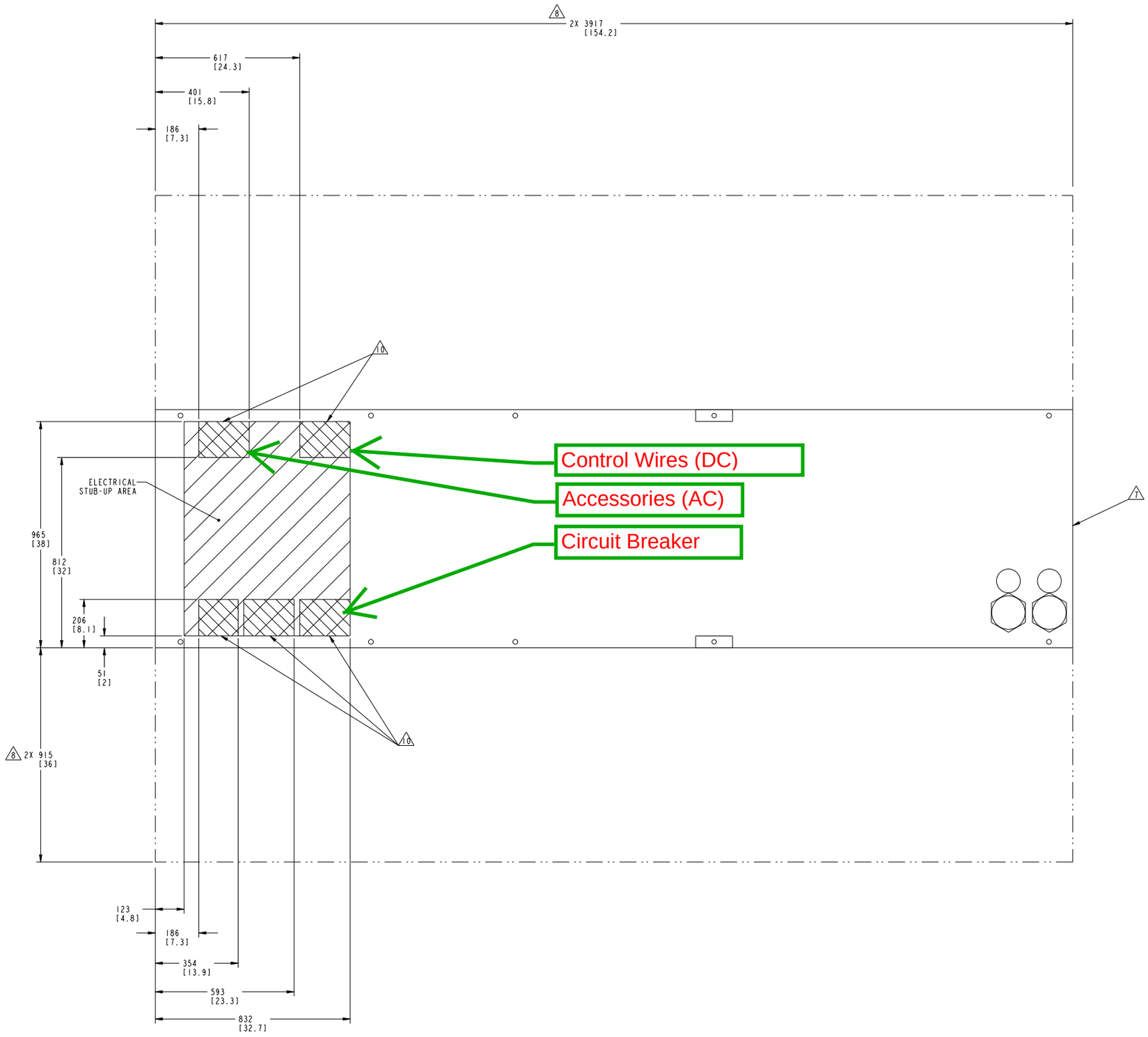
(WITH VENT EXTENSIONS)



UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS			Size	DRN D HOFMEISTER	CUMMINS POWER GENERATION
DIM X ±1 .X ±0.8 .XX± 0.38	SCALE 0.00- 4.99 +0.15/-0.08 5.00- 9.99 +0.20/-0.10 10.00-17.49 +0.25/-0.13 17.50-24.99 +0.30/-0.13	DO NOT SCALE PRINT		CKD D HOFMEISTER	OUTLINE, TANK
				APVD M JAWALE	REGIONAL
				DATE 01FEB16	SITE CODE
ANG TOL ± 1.0°	SCALE 1:8	THIS DOCUMENT AND THE INFORMATION SHOWN THEREON IS CONFIDENTIAL AND PROPRIETARY TO CUMMINS INC. AND ITS AFFILIATES AND IS NOT TO BE REPRODUCED, TRANSMITTED, DISCLOSED OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	FIRST USED ON ARROW	PGF	DWG E A054B564 CAD SHEET 2 OF 4

PTC® Creo® Parametric

REL NO	REV	NO	REVISION	DRN	CKD	APVD	DATE
ECO-173968	C	--	-----	CJF	MF	M WINGFIELD	06DEC17



UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

DIM: X ±1 | .X ±0.8 | .XX± 0.38 | ANG TOL ±1.0°

SCALE 1:8

THIS DOCUMENT AND THE INFORMATION SHOWN THEREON IS THE PROPRIETARY PROPERTY OF CUMMINS INC. AND IS NOT TO BE DISCLOSED TO OTHERS IN WHOLE OR IN PART, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.

Size 10 .

DO NOT SCALE PRINT

DRN D HOFMEISTER
CKD D HOFMEISTER
APVD M JAWALE
DATE 01FEB16

FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009

FIRST USED ON ARROW

SITE CODE PGF

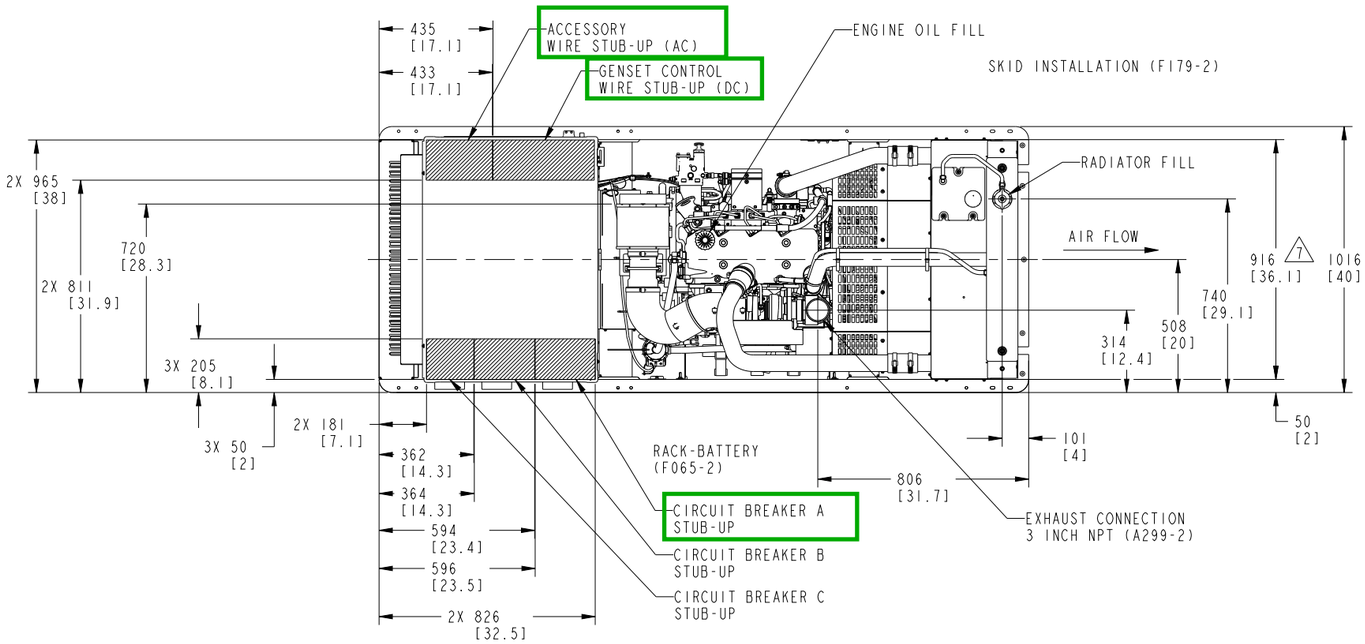
CUMMINS POWER GENERATION

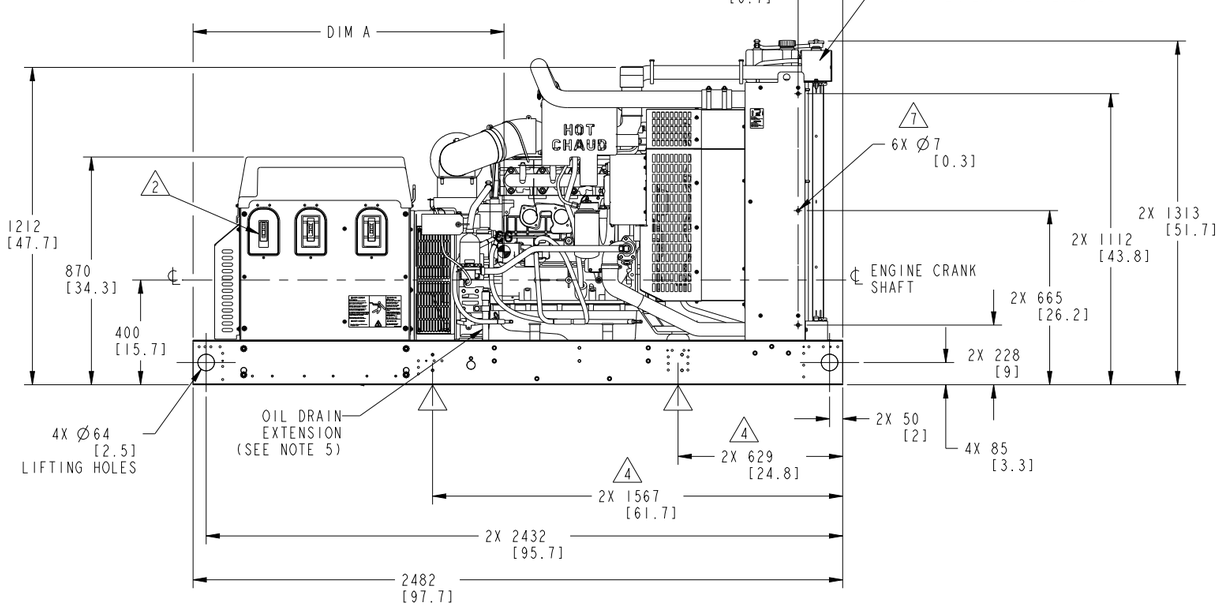
OUTLINE, TANK
REGIONAL

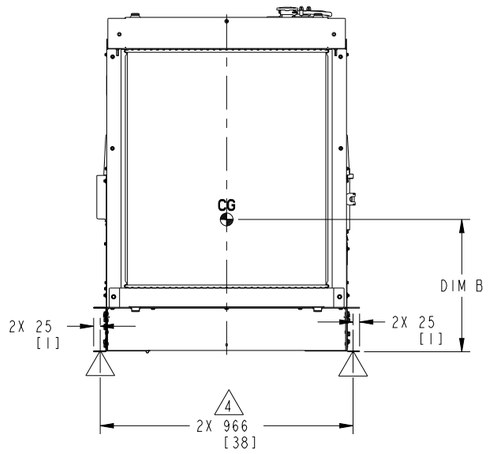
SIZE E | DWG NO A054B564 | CAD SHEET 3 of 4

PTC® Creo® Parametric

REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-179354	B	1	NOTE 9.1: 5/16" WAS 1/4"	CJF	FE	M FRITSCHE	07AUG18
		2	SEE SHEET 2	CJF	FE	M FRITSCHE	07AUG18







NOTES:

1. DIMENSIONS SHOWN IN [ ] ARE IN INCHES.
2. REFER TO CIRCUIT BREAKER OUTLINE DRAWING FOR ELECTRICAL STUB-UP AREA FOR SPECIFIC BREAKERS.
3. CONTROL INTERFACE CONNECTION SHOULD BE MADE WITH FLEXIBLE CONNECTIONS.
4. Ø21 [0.8] HOLES MARKED BY △ FOR SECURING TO MOUNTING SURFACE.
5. OIL DRAIN EXTENSION: 5/8 INCH HOSE ID.
6. FOR IBC SEISMIC CERTIFIED INSTALLATION, SEE GENSET IBC SEISMIC INSTALLATION REQUIREMENT DRAWING.
7. Ø7.3 HOLES FOR OPTIONAL COOLING EXHAUST AIR DUCT ADAPTER.
8. REFER TO GENSET FOUNDATION OUTLINE FOR ELECTRICAL AND OTHER FOUNDATION SPECIFICS.
9. GENSET SUPPLIED WITH FLEXIBLE FUEL LINE(S) THAT CAN BE CONNECTED TO GENSET INTERFACE POINT(S).

   9.1 FUEL SUPPLY LINE: 686 [27.0] LONG WITH 5/16" JIC MALE TERMINATION.

TABULATION

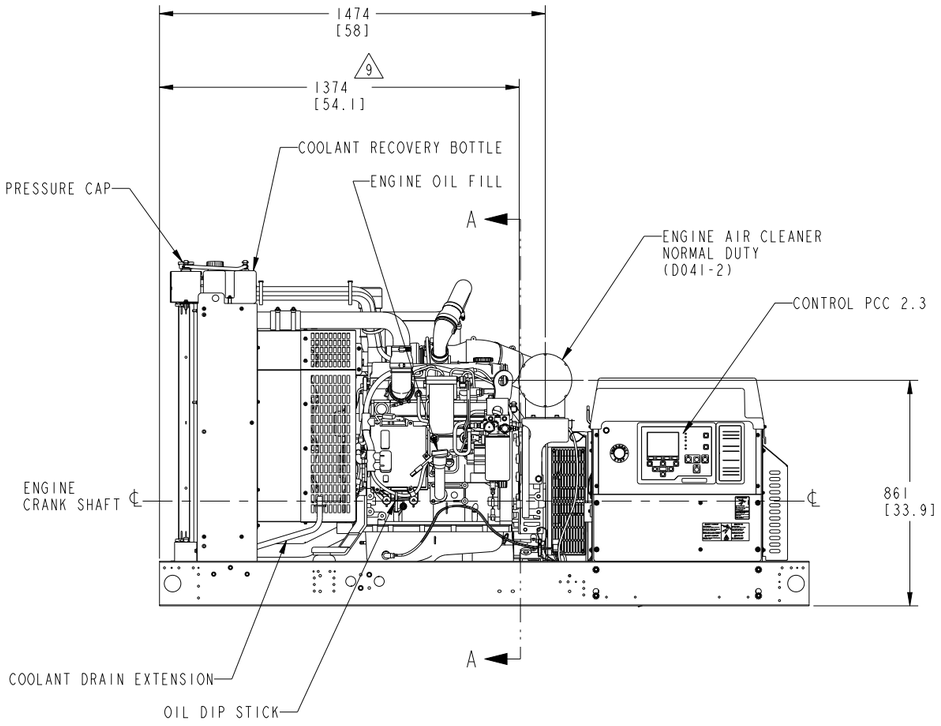
ALT DATA SHEET #	DIM A	DIM B	GENSET WET WEIGHT KG	GENSET WET WEIGHT LB
ADS-202	1092	456	1090	2403
ADS-203	1207	495	986	2173
ADS-204	1184	492	1006	2217
ADS-205	1125	486	1054	2324
ADS-206	1086	482	1082	2386
ADS-207	1060	480	1106	2439
ADS-208	998	473	1173	2586
ADS-209	958	469	1211	2670

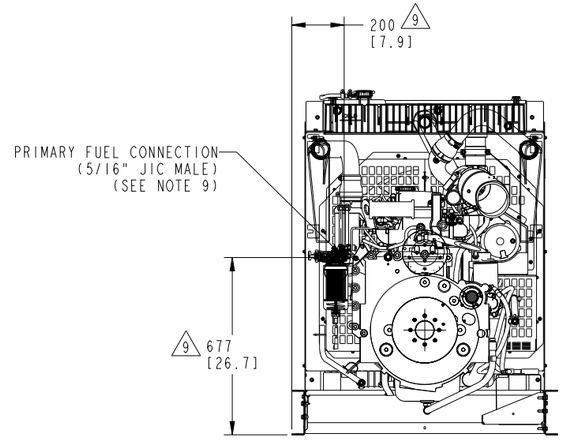
C50 D6C, C60 D6C, C80 D6C,
C100 D6C, C125 D6C

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS		SIM TO .	DWN D HOFMEISTER	Cummins®	CUMMINS POWER GENERATION
DIM: X ±1; .X ±0.8; .XX± 0.38 — HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13		DO NOT SCALE PRINT	CKD D HOFMEISTER		
			APVD M JAWALE	SITE CODE	OUTLINE,GENSET
ANG TOL ± 1.0°	SCALE 3:32	THIS DOCUMENT (AND THE INFORMATION SHOWN THEREON) IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN HARD COPY OR ELECTRONIC FORM, REPRODUCED BY ANY MEANS, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	DATE 17MAR16 — FIRST USED ON ARROW — FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009	PGF	DWG SIZE D A054Y897 — CAD SHEET 1 OF 2

PTC® Creo® Parametric

REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-179354	B	2	ZONE C-3: 5/16" WAS 1/4"	CJF	FE	M FRITSCHE	07AUG18





SECTION A-A

C50 D6C, C60 D6C, C80 D6C,
C100 D6C, C125 D6C

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

DIM		HOLE	
X	±1	0.00- 4.99	+0.15/-0.08
.X	±0.8	5.00- 9.99	+0.20/-0.10
.XX	±0.38	10.00-17.49	+0.25/-0.13
		17.50-24.99	+0.30/-0.13

ANG TOL ± 1.0°

SCALE 3:32

SIM TO .

DO NOT SCALE PRINT

DWN	D HOFMEISTER
CKD	D HOFMEISTER
APVD	M JAWALE
DATE	17MAR16

FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009

FIRST USED ON ARROW

CUMMINS POWER GENERATION

OUTLINE,GENSET

SITE CODE PGF

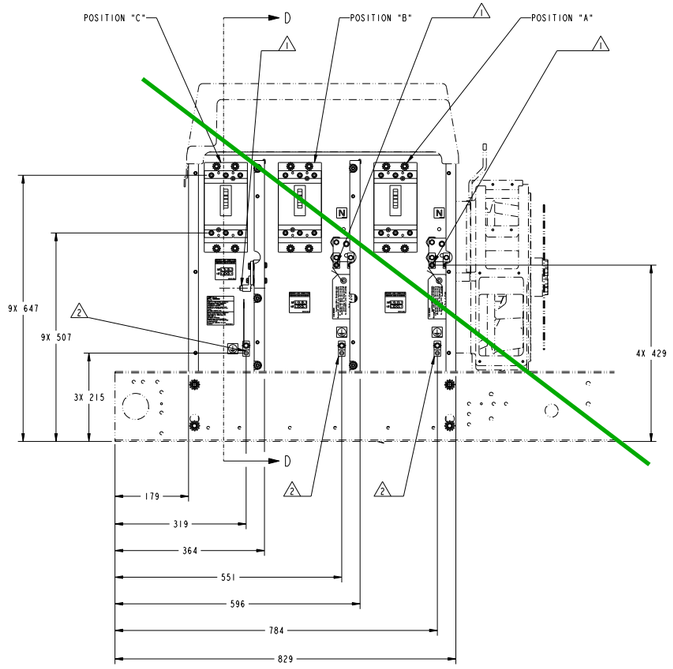
DWG SIZE D A054Y897

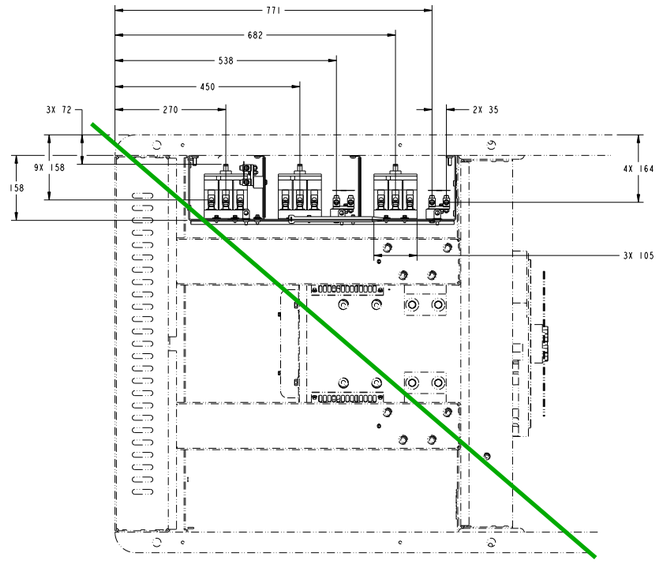
CAD SHEET 2 OF 2

PIC® Creo® Parametric

REL NO	LTR	NO	REVISION	BY	CHD	APVD	DATE
ECO-151815	B	1	PRODUCTION RELEASE	KD	PL	P.LARSON	20APR15
		2	DRAWING HAS BEEN PICTORIALLY UPDATED	KD	PL	P.LARSON	20APR15
		3	RMV C11 LABEL	KD	PL	P.LARSON	20APR15
		4	UPDATE NOTES & TAB - SEE ECO	KD	PL	P.LARSON	20APR15
		5	SEE SHEET 2	KD	PL	P.LARSON	20APR15
		6	SEE SHEET 3	KD	PL	P.LARSON	20APR15

"H" FRAME SHOWN (15 - 150 amp)

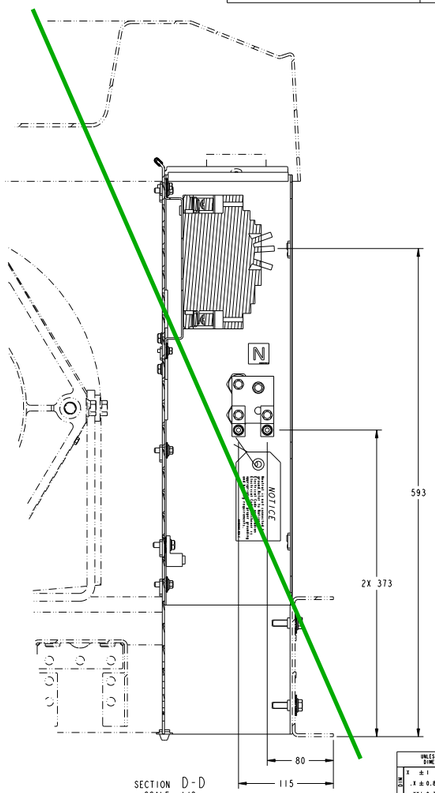




NOTES:

1. NEUTRAL LUG (1) #14-2/0
2. GROUND LUG (1) #14-1/0
3. NEUTRAL LUG (1) #6-350 kcmil.
4. NEUTRAL LUG (2) #2-600 kcmil OR (4) 1/0-250 kcmil.

FRAME	LUG	LUG WIRE RANGE	WIRE STRIP LENGTH	CB LUG TORQUE
H-FRAME THERMAL-MAGNETIC 15-150 AMP 80% RATED	AL150HD	(1) AL #14 - 3/0 AWG (1) CU #14 - 3/0 AWG	0.65 inch	#14 - #10 50 lb-in (6.0 Nm) #8 - 3/0 120 lb-in (14.0 Nm)
J-FRAME THERMAL-MAGNETIC 175 AMP 80% RATED	AL175HD	(1) AL #4 - 4/0 AWG (1) CU #4 - 4/0 AWG	1.00 inch	225 lb-in (26.0 Nm)
J-FRAME THERMAL-MAGNETIC 200-250 AMP 80% RATED	AL250JD	(1) AL 3/0 - 350 kcmil (1) CU 3/0 - 350 kcmil	1.00 inch	225 lb-in (26.0 Nm)
J-FRAME LSI ELECTRONIC TRIP ADJUSTABLE TRIP 70-250 AMP 100% RATED, COPPER CONDUCTORS ONLY	CU250JD	(1) CU 1/0 - 300 kcmil	1.00 inch	250 lb-in (28.0 Nm)
L-FRAME (400) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 125-400 AMP 80% RATED	AL400L61K3	(1) AL #2 - 500 kcmil (1) CU #2 - 600 kcmil	1.20 inch	442 lb-in (50 Nm)
L-FRAME (400) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 125-400 AMP 100% RATED, COPPER CONDUCTORS ONLY	AL600LS52K3	(2) CU 2/0 - 500 kcmil	(1) 1.20 inch (1) 2.40 inch	442 lb-in (50 Nm)
L-FRAME (600) LSI ELECTRONIC TRIP ADJUSTABLE TRIP 200-600 AMP 80% RATED	AL600LS52K3	(2) AL 2/0 - 500 kcmil (2) CU 2/0 - 500 kcmil	(1) 1.20 inch (1) 2.40 inch	442 lb-in (50 Nm)



SECTION D-D
SCALE 1/2

CIRCUIT BREAKER ACCESSORIES	
1	SHUNT TRIP (MX) P/N A043X760 12 VDC COIL BURDEN < 5 WATTS 10 AMP INRUSH
2	AUXILIARY CONTACTS P/N A043X785 OPEN/CLOSED (OC) TRIP INDICATION (SD) FORM C CONTACTS RATING: 6 AMPS AT 24 VAC, 48 VAC, 110 VAC 6 AMPS AT 24 VDC 2.5 AMPS AT 48 VDC 0.6 AMPS AT 110 VDC H & J FRAME, MAXIMUM OF 4 CONTACTS PER CIRCUIT BREAKER L FRAME, MAXIMUM OF 5 CONTACTS PER CIRCUIT BREAKER

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

DECIMAL		SCALE
X ±1		0.00-4.99 ±0.15/-0.00
.X ±0.8		5.00-9.99 ±0.20/-0.10
.XX± 0.38		10.00-17.49 ±0.25/-0.13
ANG TOL: ± 1.0°		17.50-24.99 ±0.30/-0.13

DO NOT SCALE PRINT

CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP

DRN K.DEIVASIGAMANI
CHD P.LARSON
APVD P.LARSON
DATE 21JAN15

SCALE: 1/4

CUMMINS POWER GENERATION

OUTLINE, CIRCUIT BREAKER

SITE CODE

PGF

CD E A049J918

SHEET 1 OF 3

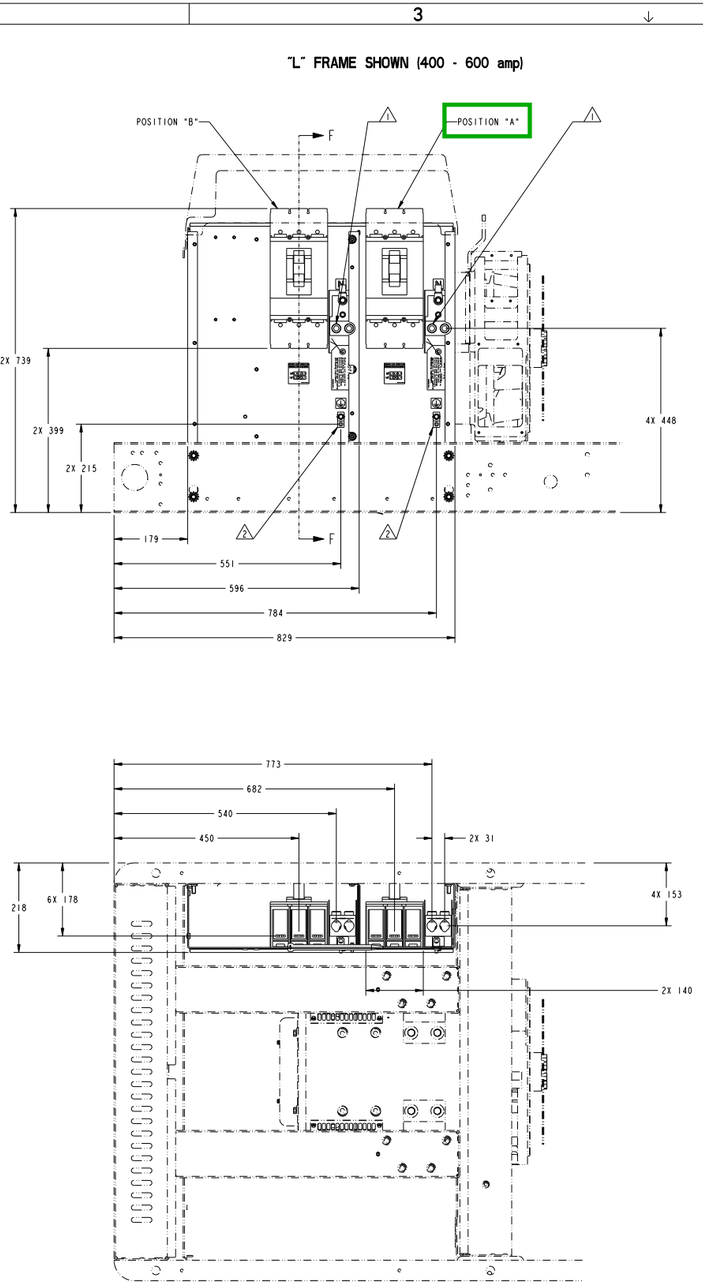
REV B

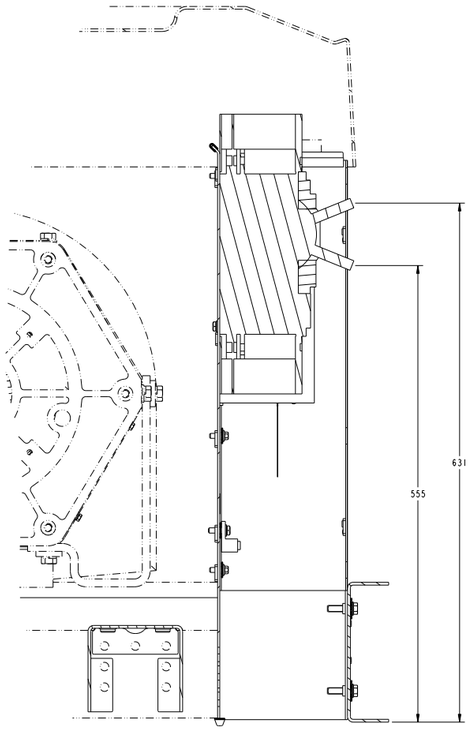
Drawing Name: A049J919 Revision: B
Part Name: A049J918 Revision: B
Sheet 1 of 4

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DRN	CHD	APVD	DATE
ECO-151815	B	1	PRODUCTION RELEASE	KD	PL	P.LARSON	20APR15
		6	ZONE (D3) ADD PHRASE "(400-600 amp)"	--	--	--	
			TO "L" FRAME SHOWN"	KD	PL	P.LARSON	20APR15

"L" FRAME SHOWN (400 - 600 amp)





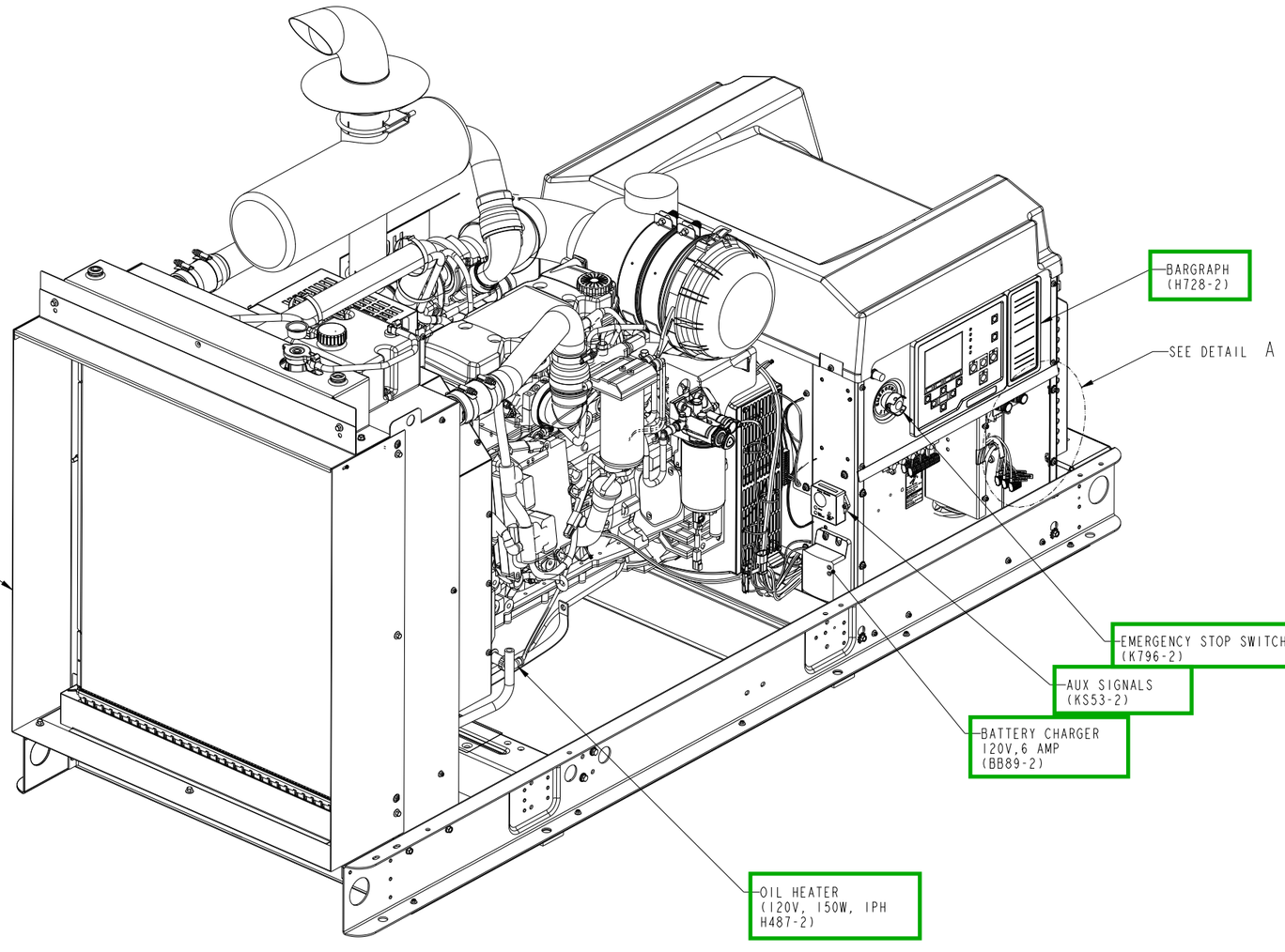
SECTION F-F
SCALE 1/2

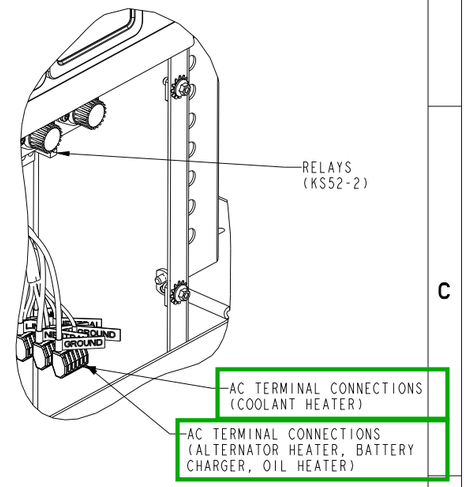
UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS			DO NOT SCALE PRINT	DRN K.DEIVASIGAMANI	CUMMINS POWER GENERATION
X ±1	SURFACE FINISH	0.00-4.99 +0.15/-0.00 5.00-9.99 +0.20/-0.10 10.00-17.49 +0.25/-0.13 17.50-24.99 +0.30/-0.13		CHD P.LARSON APVD P.LARSON DATE 21JAN15	
.X ±0.8					OUTLINE,CIRCUIT BREAKER
.XX ±0.38					SITE CODE PGF
ANG TOL: ± 1.0°	SCALE: 1/4		CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	USED ON ARROW	SIZE A DWG NO A049J918 SHEET 3 OF 3 REV B

Drawing Name: A049J919 Revision: B
Part Name: A049J918 Revision: B
Sheet 3 of 4

NOTES:

1. DIMENSIONS SHOWN IN [ ] ARE IN INCHES.

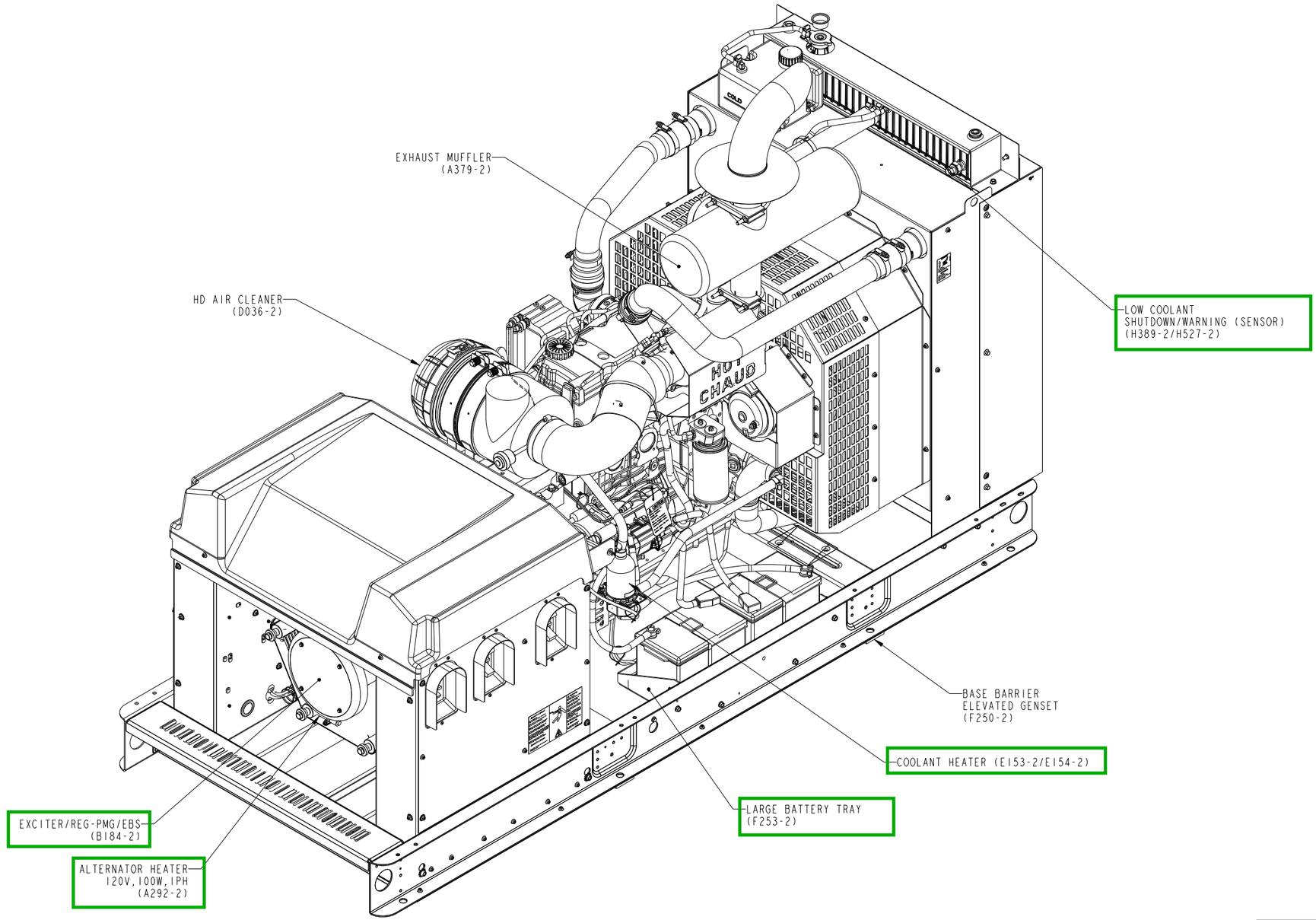




DETAIL A
SCALE 1:2

C50 D6C, C60 D6C, C80 D6C,
C100 D6C, C125 D6C

MODEL/PLATFORM: ARROW	THIS PART IS SIMILAR TO: NONE
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: D SCALE:3:16
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric



C50 D6C, C60 D6C, C80 D6C,
C100 D6C, C125 D6C

Cummins Inc.		
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: D	SCALE:3:16
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric

Document Generated: **06DEC2021 13:44 GMT**

Part Number: **A054Y899** Part Revision: **D**
Part Name: **OUTLINE,GENSET**
Drawing Category: **Detail** State: **Released**

PTC® Creo® Parametric

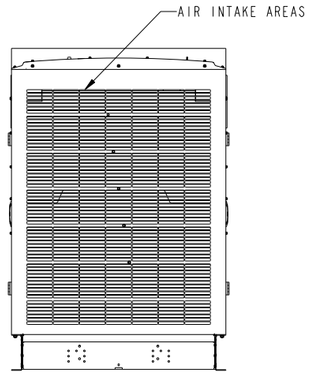
REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-152551	A	1	PRODUCTION_RELEASE	CG	NK	M_WICKMANN	14MAY15

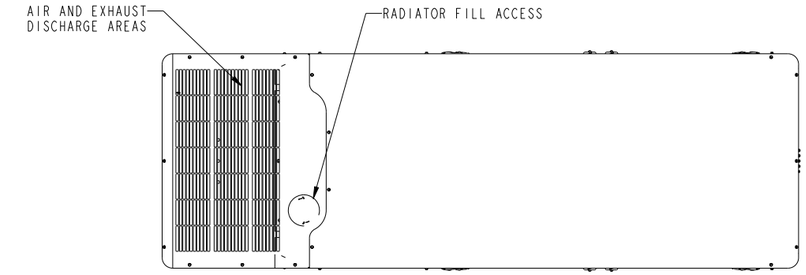
Estimated Package Weight (Dry Tank) 4,117 lbs.

Estimated Package Weight (Wet Tank) 5,842 lbs.

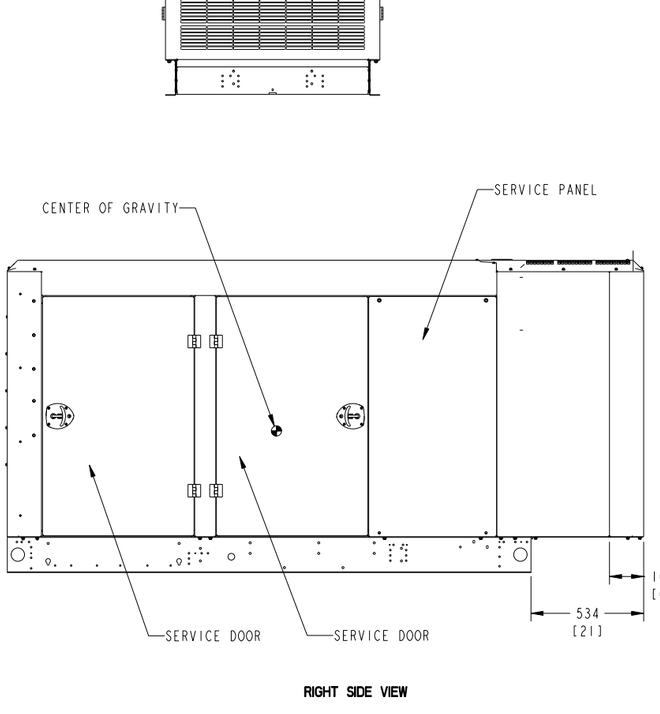
NOTES:

1. DIM [] IN INCHES
2. WHEN THE HOUSING INSTALLED ON AN OPEN GENERATOR SET, THE TOTAL WEIGHT WILL INCREASE BY 131.5 KG (290 LBS). THIS INCLUDES THE MUFFLER.
3. THE CENTER OF GRAVITY(CG) OF THE GENERATOR SET WHEN EQUIPPED WITH THIS HOUSING SHIFTS APPROXIMATELY 65mm (2.55 inch) TOWARDS THE AIR DISCHARGE END OF THE HOUSING AND 42MM (1.66 INCH) HIGHER FROM THE GROUND. COMPARED TO THE EQUIVALENT NON-HOUSED PRODUCT WITH THE F179 SKID. SEE HOUSING READY SKID BASE OUTLINE DRAWING FOR CG LOCATION OF NON HOUSED PRODUCT.

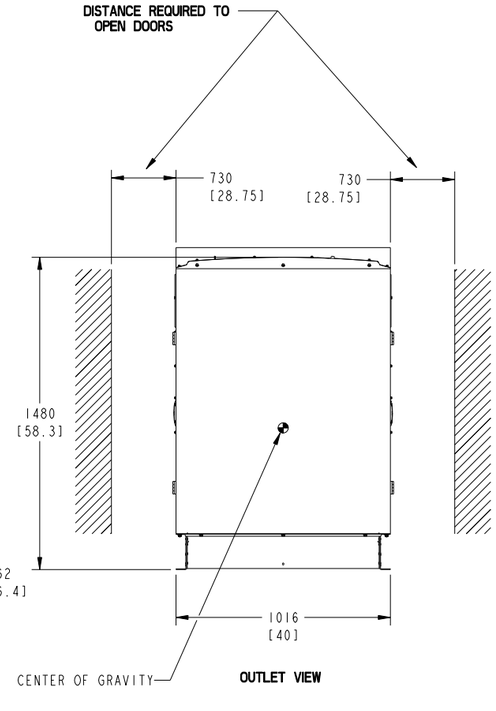




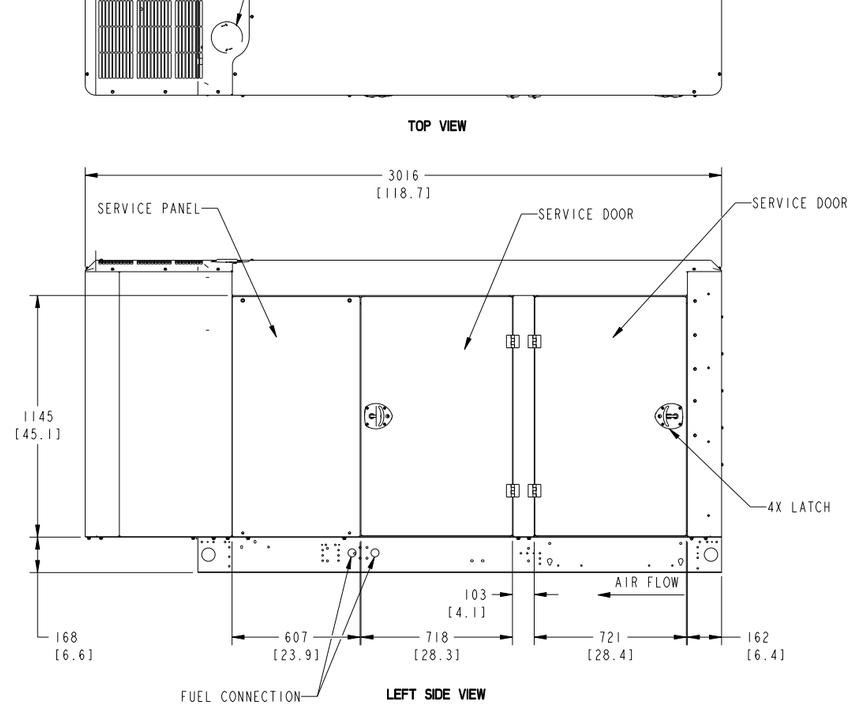
TOP VIEW



RIGHT SIDE VIEW



OUTLET VIEW



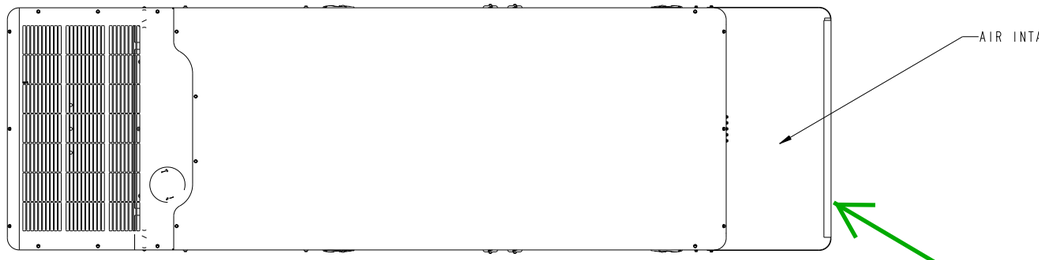
LEFT SIDE VIEW

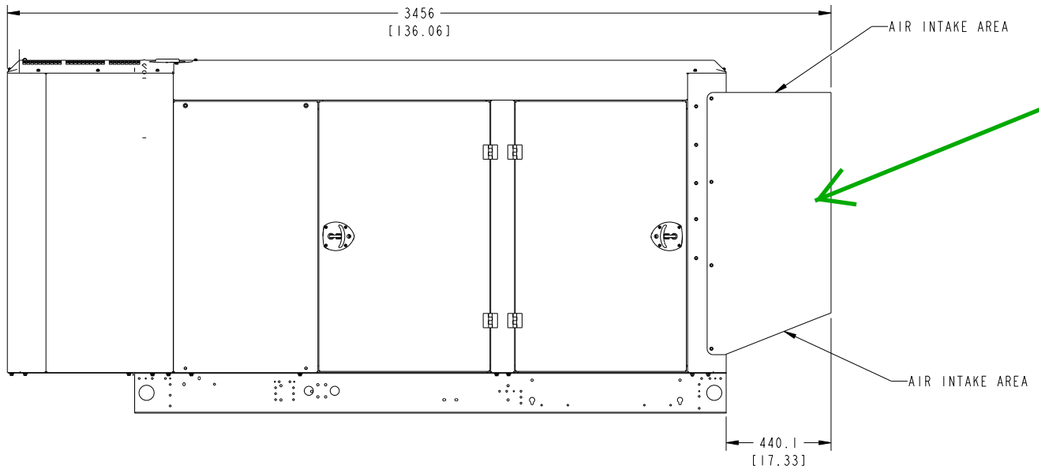
F231-2 ENCLOSURE CONFIGURATION

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS	SIM TO NONE	DRN C_GADE		CUMMINS POWER GENERATION	
DIM: X ± 1, .X ± 0.8, .XX± 0.38 — HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13	DO NOT SCALE PRINT	CKD N_KASIBHOTLA		OUTLINE,ENCLOSURE	
ANG TOL: ± 1.0°	SCALE: ~3/32	APVD M_WICKMANN	SITE CODE		
- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP		DATE 14MAY15	PGF	DWG SIZE D — A051P365	SHEET 1 OF 2 — DWG REV A
		FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994 — FIRST USED ON ARROW			

PTC® Creo® Parametric

REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-152551	A	1	PRODUCTION_RELEASE	CG	NK	M_WICKMANN	14MAY15





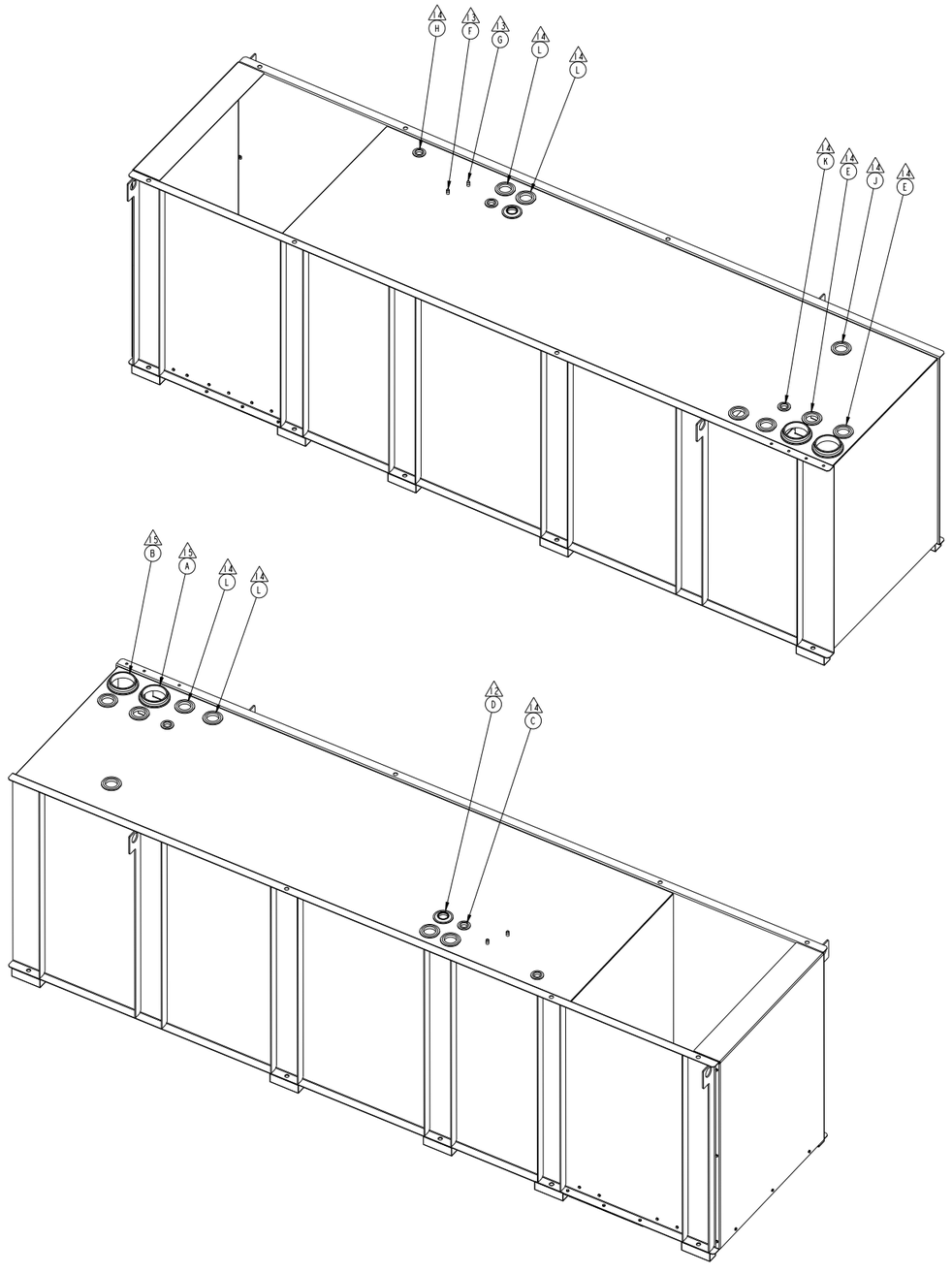
Hood shipped loose

F217-2 ENCLOSURE CONFIGURATION

REFER TO PAGE 1 (F231-2 ENCLOSURE FOR OTHER F217-2 ENCLOSURE DIMENSIONS.

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS	SW TO NONE	DRN C_GADE		CUMMINS POWER GENERATION	
DIM: X ±1, .X ±0.8, .XX± 0.38 — HOLE: 0.00- 4.99 +0.15/-0.08, 5.00- 9.99 +0.20/-0.10, 10.00-17.49 +0.25/-0.13, 17.50-24.99 +0.30/-0.13	DO NOT SCALE PRINT	CKD N_KASIBHOTLA		OUTLINE,ENCLOSURE	
		APVD M_WICKMANN			
	- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP	DATE 14MAY15	SITE CODE		
ANG TOL: ± 1.0° — SCALE: ~3/32	FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994	FIRST USED ON ARROW	PGF	DWG SIZE D — A051P365	SHEET 2 of 2 — DWG REV A

Drawing Name: A051P366 Revision: A
Part Name: A051P365 Revision: A
Sheet 2 of 3



FUEL TANK COMPONENT LIST	
A	PRIMARY EMERGENCY VENT
B	SECONDARY EMERGENCY VENT
C	LOW FUEL SWITCH
D	FUEL GAUGE
E	NORMAL VENT
F	ENGINE SUPPLY
G	ENGINE RETURN
H	RUPTURE BASIN SWITCH
J	FUEL FILL
K	HIGH FUEL ALARM
L	SPARE

NOTES:

1. TANKS ARE UL142 LISTED. SECONDARY CONTAINMENT FUEL TANK. REFER TO TANK LABELS AND LOCAL CODE TO DETERMINE VENTING REQUIREMENTS FOR BOTH COMPARTMENTS.

2. SUBBASE FUEL TANK MOUNTING. EXCESSIVE TWISTING OF THE FUEL TANK MAY RESULT IN STRUCTURAL FAILURE OF THE TANK. TO ENSURE THE INSTALLATION DOES NOT EXCESSIVELY TWIST THE FUEL TANK, THE FOLLOWING PROCEDURE MUST BE OBSERVED:

   2.1 REFER TO APPLICATION MANUAL T030 FOR GENERAL SET MOUNTING GUIDELINES.

   2.2 AFTER PLACING SET ON FOUNDATION, VERIFY ALL FOUR MOUNTING PADS CONTACT FOUNDATION.

   2.3 THERE ARE SHIMS ATTACHED TO EACH FUEL TANK. THESE ARE INTENDED TO FILL ANY GAP BETWEEN THE MOUNTING PADS AND FOUNDATION.

   2.4 INSERT THE MAXIMUM HEIGHT STACK OF SHIMS THAT WILL SLIDE INTO THE GAP.

   2.5 TIGHTEN TANK HOLD DOWN MOUNTING FASTENERS.

3. FOR IBC SEISMIC CERTIFIED INSTALLATIONS, SEE GENSET IBC SEISMIC INSTALLATION REQUIREMENTS DRAWING.

4. FUEL TANK HAS A FLANGE THICKNESS OF UP TO 10 mm [0.394 in]. ALLOW EXTRA LENGTH ON HARDWARE FOR UNEVENNESS OF MOUNTING SURFACE.

5. LIFTING BASE OF FUEL TANK PERIMETER IS SHOWN. FOUNDATION SHOULD BE EXTENDED BEYOND THIS PERIMETER. SEE T-030 APPLICATION MANUAL FOR FURTHER INSTRUCTIONS.

6. REMOVABLE STUB-UP ACCESS PANEL.

7. MAINTAIN MIN 51 mm [2] CLEARANCE ABOVE E-VENT.

8. WEIGHT AND CENTER OF GRAVITY INFORMATION IS ESTIMATED AND CHANGES WITH TANK FEATURE INSTALLATION.

9. DRY WEIGHT REFERS TO TANK WITH NO LIQUID. WET WEIGHT REFERS TO TANK FILLED WITH DIESEL TO MAXIMUM USEABLE VOLUME.

10. NOMINAL TANK VOLUME REFERS TO OVERALL TANK VOLUME. USEABLE TANK VOLUME REFERS TO MAXIMUM FILL VOLUME OF TANK.

11. CENTER OF GRAVITY DIMENSIONS REFER TO A DRY TANK.

12. HEIGHT FROM TANK SURFACE TO TOP OF RISER IS 9.52 MM [0.37]

13. HEIGHT FROM TANK SURFACE TO TOP OF RISER IS 21.52 MM [0.84]

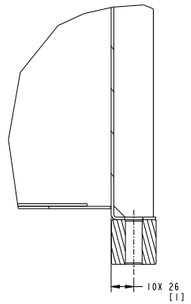
14. HEIGHT FROM TANK SURFACE TO TOP OF RISER IS 7.94 MM [0.31]

15. HEIGHT FROM TANK SURFACE TO TOP OF RISER IS 26.97 MM [1.06]

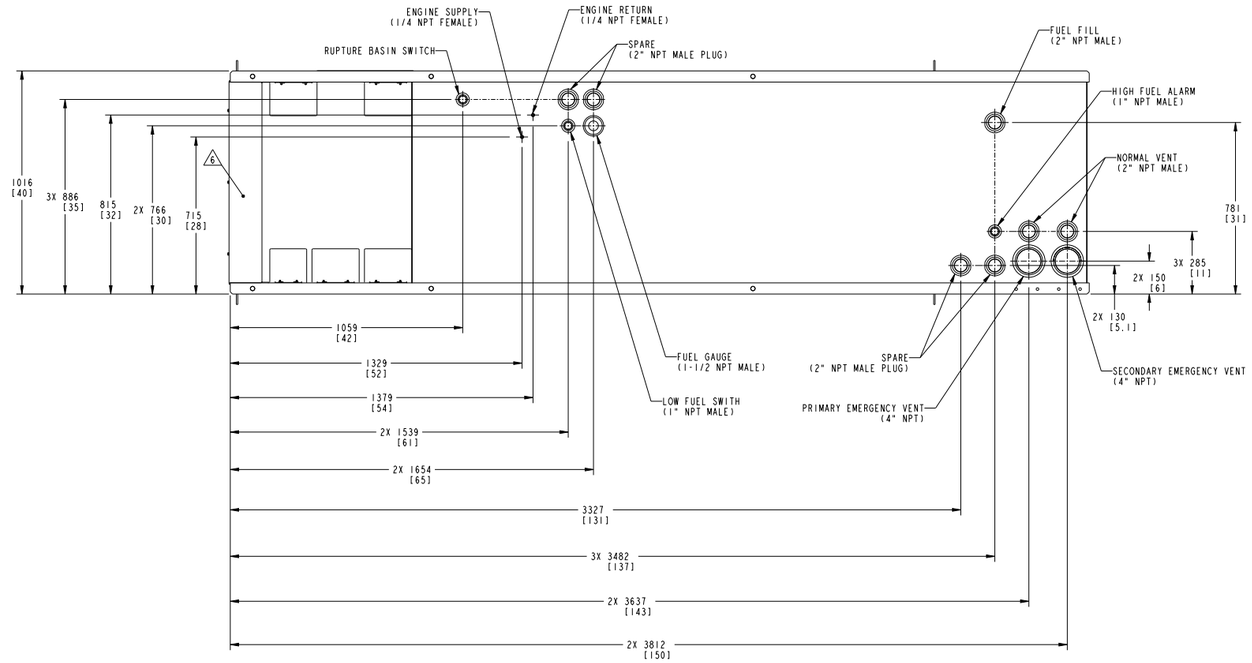
Cummins Inc.		
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN:	SIZE: A0	SCALE: 1:8
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION	CAD SYSTEM PTC® Creo® Parametric

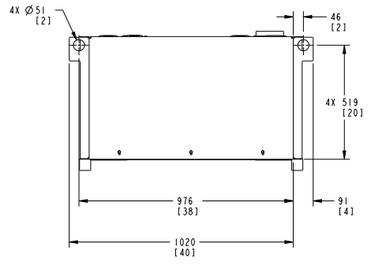
270 GALLON FUEL TANK (A053L909)

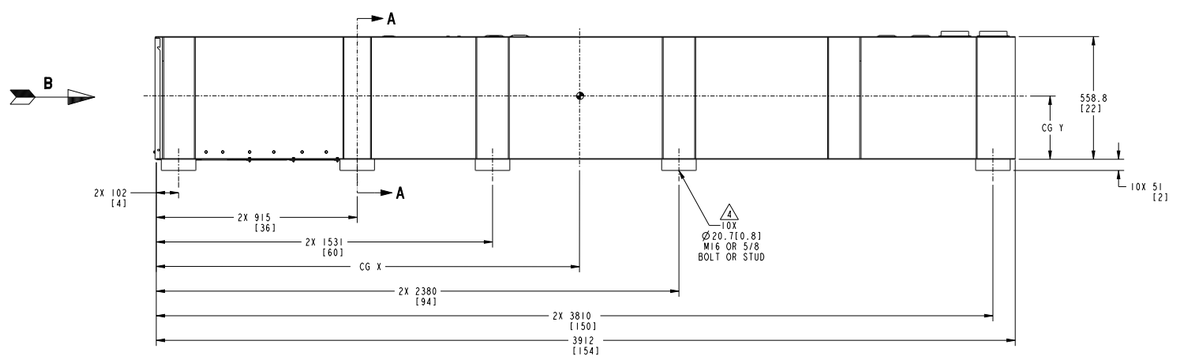
TABULATION							
WEIGHT KG [LBS]		TANK VOLUME LITERS [GAL]		TANK HEIGHT MM [IN]		CENTER OF GRAVITY MM [IN]	
DRY	WET	NOMINAL	USEABLE	EXTERNAL	INTERNAL	CG X	CG Y
607 [1338]	1457 [3213]	1045 [276]	1022 [270]	558 [22]	458.7 [18.06]	2170 [85]	283 [11]



SECTION **A-A**
SCALE 1/2
VIEW FROM **B**







Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN:	SIZE: A0 SCALE: 1/8
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric

A053L909 TANK DEPTH CHART			
HEIGHT (IN)	HEIGHT (MM)	USABLE VOLUME (GAL.)	TOTAL VOLUME (GAL.)
0.5	12.7	0	8
2	50.8	23	31
4	101.6	55	61
6	152.4	86	92
8	203.2	116	122
10	254	147	153
12	304.8	177	183
14	355.6	208	214
16	406.4	239	244
18.06	458.7	270	276
20.3	515.62		310

A053L911 TANK DEPTH CHART			
HEIGHT (IN)	HEIGHT (MM)	USABLE VOLUME (GAL.)	TOTAL VOLUME (GAL.)
0.5	12.7	0	8
2	50.8	25	31
4	101.6	55	61
6	152.4	86	92
8	203.2	116	122
10	254	147	153
12	304.8	177	183
14	355.6	208	214
16	406.4	239	244
18	457.2	269	275
20	508	300	305
22	558.8	330	336
24	609.6	361	366
26	660.4	391	397
28	711.2	422	427
28.21	716.5	425	431
30.3	769.62		463

A053L912 TANK DEPTH CHART			
HEIGHT (IN)	HEIGHT (MM)	USABLE VOLUME (GAL.)	TOTAL VOLUME (GAL.)
0.5	12.7	0	8
2	50.8	25	31
4	101.6	55	61
6	152.4	86	92
8	203.2	116	122
10	254	147	153
12	304.8	177	183
14	355.6	208	214
16	406.4	239	244
18	457.2	269	275
20	508	300	305
22	558.8	330	336
24	609.6	361	366
26	660.4	391	397
28	711.2	422	427
30	762	452	458
32	812.8	483	489
34	863.6	513	519
36	914.4	544	550
38	965.2	574	580
40	1016	605	611
41.31	1049.3	625	631
44.3	1125.22		676

Cummins Inc.
DIMENSIONS ARE IN: MILLIMETERS
[ ] ARE IN:
SIZE: A0 SCALE: 1/16
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009
THIRD ANGLE PROJECTION
CAD SYSTEM PTC® Creo® Parametric

PTC® Creo® Parametric

REL NO	REV	NO	REVISION	DRN	CKD	APVD	DATE
ECO-181411	E	1	SEE SHEET 5	PT	MT	M.TULADHAR	01NOV18
		2	SEE SHEET 5	PT	MT	M.TULADHAR	01NOV18
		3	SEE SHEET 5	PT	MT	M.TULADHAR	01NOV18
		4	SEE SHEET 5	PT	MT	M.TULADHAR	01NOV18

COMES ON THE ENGINE

NOTES:

1. ALL DEVICES ARE SHOWN DE-ENERGIZED.
2. QSB5 AND QSB7: 12V SYSTEM BATTERIES CONNECTED IN PARALLEL. QSL9: 24V SYSTEM BATTERIES CONNECTED IN SERIES.
3. RELAYS RATED FOR 12V USED ON QSB5 AND QSB7. RELAYS RATED FOR 24V USED ON QSL9.
4. QSB5 AND QSB7: USE 12V BATTERY CHARGER. QSL9: USE 24V BATTERY CHARGER.

60 PIN CONN

CRANKSHAFT SPEED SENSOR
- CRANKSHAFT POSITION SIGNAL — 27
- CRANKSHAFT POSITION RETURN — 48
- CRANKSHAFT POSITION 5 VOLT SUPPLY — 16

CAMSHAFT POSITION SENSOR
- CAMSHAFT POSITION SIGNAL — 26
- CAMSHAFT POSITION RETURN
- CAMSHAFT POSITION 5 VOLT SUPPLY

RAIL FUEL PRESSURE SENSOR
- RAIL FUEL PRESSURE RETURN
- RAIL FUEL PRESSURE SIGNAL — 25
- RAIL FUEL PRESSURE 5 VOLT SUPPLY

WATER IN FUEL SENSOR
- WATER IN FUEL SIGNAL — 14
- WATER IN FUEL RETURN

INTAKE MANIFOLD PRESSURE/AIR TEMPERATURE SENSOR
- INTAKE MANIFOLD PRESSURE SIGNAL — 44
- INTAKE MANIFOLD PRESS/TEMP +5 VDC SUPPLY — 37
- INTAKE MANIFOLD AIR TEMP SIGNAL — 23
- INTAKE MANIFOLD PRESSURE/TEMP RETURN — 47

ENGINE OIL PRESSURE SENSOR
- ENGINE OIL PRESSURE SIGNAL — 13
- ENGINE OIL PRESSURE RETURN
- ENGINE OIL PRESSURE 5V SUPPLY

BAROMETRIC PRESSURE SENSOR
- BAROMETRIC PRESSURE SIGNAL — 03
- BAROMETRIC PRESSURE RETURN — 38
- BAROMETRIC PRESSURE 5 VOLT SUPPLY — 33

ENGINE COOLANT TEMPERATURE SENSOR
- ENGINE COOLANT TEMPERATURE SIGNAL — 15
- ENGINE COOLANT TEMPERATURE RETURN

FUEL PUMP ACTUATOR
- FUEL PUMP ACTUATOR SIGNAL — 02
- FUEL PUMP ACTUATOR RETURN — 32

SAE J1939 ENGINE DATALINK
- SAE J1939 ENGINE (+) — 08
- SAE J1939 ENGINE (-) — 06

6 CYLINDER ENGINES (QSB7 & QSL9)

PASS-THROUGH CONNECTORS

INJECTOR 1	CYLINDER NUMBER 1 DRIVER	45
	CYLINDER NUMBER 1 RETURN	53
INJECTOR 2	CYLINDER NUMBER 2 DRIVER	54
	CYLINDER NUMBER 2 RETURN	51
INJECTOR 3	CYLINDER NUMBER 3 DRIVER	55
	CYLINDER NUMBER 3 RETURN	52
INJECTOR 4	CYLINDER NUMBER 4 DRIVER	56
	CYLINDER NUMBER 4 RETURN	58
INJECTOR 5	CYLINDER NUMBER 5 DRIVER	46
	CYLINDER NUMBER 5 RETURN	60
INJECTOR 6	CYLINDER NUMBER 6 DRIVER	57
	CYLINDER NUMBER 6 RETURN	59

4 CYLINDER ENGINE (QSB5)

PASS-THROUGH CONNECTORS

INJECTOR 1	CYLINDER NUMBER 1 DRIVER	45
	CYLINDER NUMBER 1 RETURN	53
INJECTOR 2	CYLINDER NUMBER 2 DRIVER	57
	CYLINDER NUMBER 2 RETURN	59
INJECTOR 3	CYLINDER NUMBER 3 DRIVER	46
	CYLINDER NUMBER 3 RETURN	60
INJECTOR 4	CYLINDER NUMBER 4 DRIVER	55
	CYLINDER NUMBER 4 RETURN	52

CM850

BATTERY (-) (+) [2]

STARTER SWITCH

STARTER (B+1, GND)

PWR
- C02,C05 PWR — W-04
- POWER TO KEY SW,LCL/HMI — W-01
- STARTER B+ — W-03
- CONTROL B+ — W-02
- SWITCHED B+ — W-16
- CRANK — W-06
- KEY SWITCH — W-07
- C02 PWR — W-09
- CONTROL GROUND — W-10
- C05 PWR — W-05

TO PAGE 2

BATTERY CHARGING ALTERNATOR (CHRG ALT B+, CHRG ALT GND) — W-12

C02
- 1 — W-13 — SP1 — W-15
- 2 — W-14
- 3 — W-18 — SP5 — W-19
- 4

W-17

TO BE USED ONLY BY AUTHORIZED PERSONNEL

C05 ECM PROGRAMMING CONNECTOR (A, C, D, E, B)

W-22, W-23

P50

C01
- 46 — W-24 — SP2 — W-26
- 47 — W-25 — SP3 — W-27
- 37 — SP4
- 28 — W-28 — 16k
- 32 — W-29 — SP6
- 39

W-20, W-21, W-08

W-31

LCL (A, B, C, D)

W-32, W-33

SIG
- 6 — LCL B+
- 5 — LCL SIG
- 3 — CAN+
- 4 — CAN-
- 2 — CAN SHIELD

TO PAGE 2

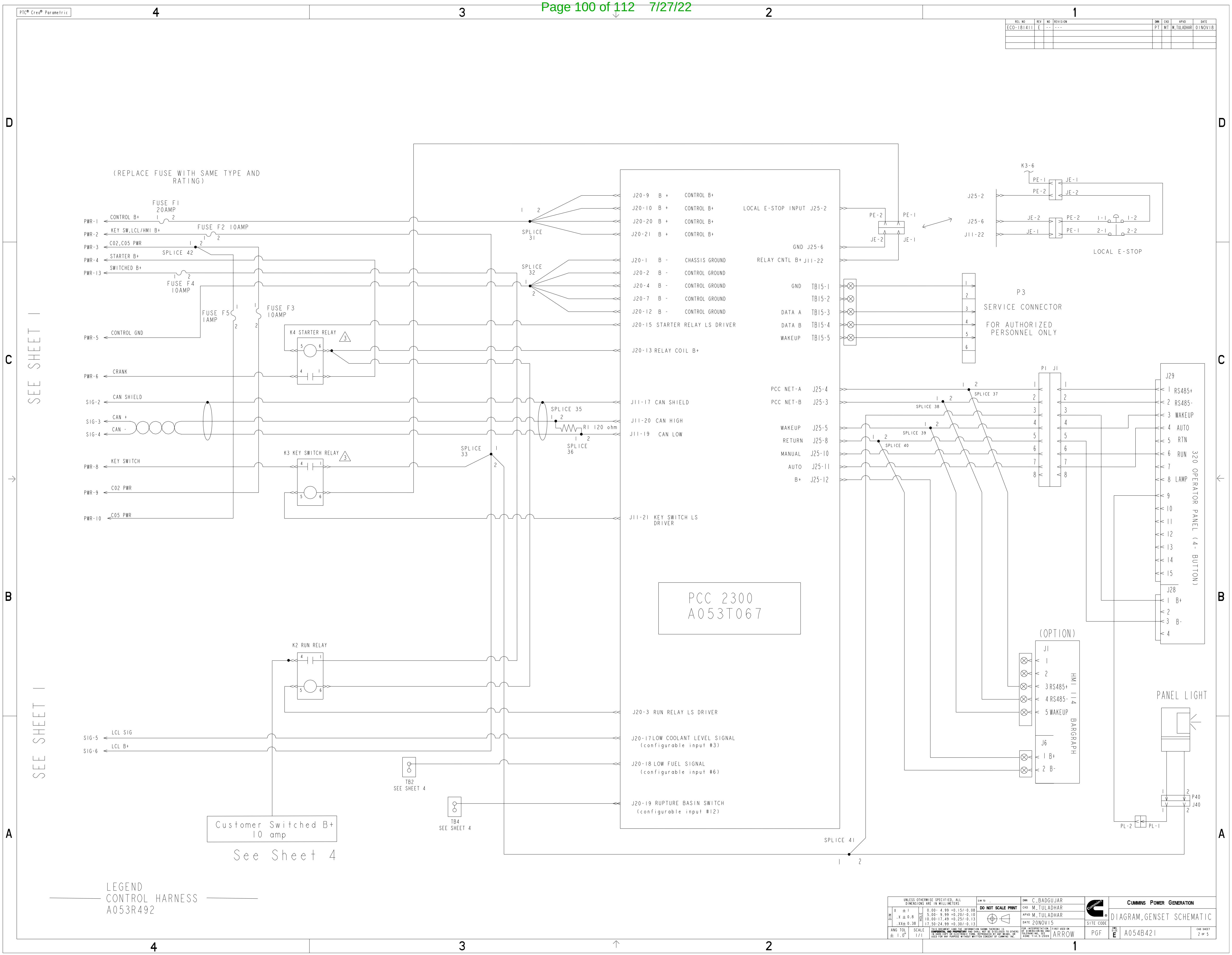
FOR QSB5 (12V), QSB7 (12V) AND QSL9 (24V) WITH PCC 2300

LEGEND:

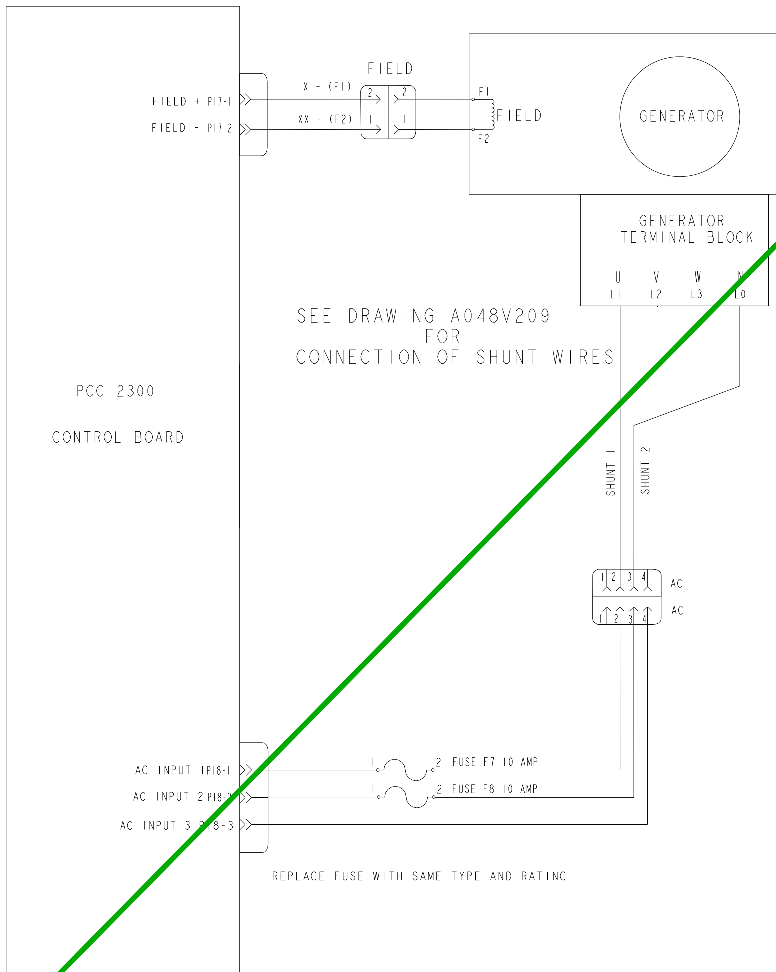
ENGINE HARNESS
A053T310

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS	DO NOT SCALE PRINT	DRN C_BADGUJAR	CUMMINS POWER GENERATION		
DIM: X ±1, .X ±0.8, .XX± 0.38 — DECI: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13		CKD M_TULADHAR			
		APVD M_TULADHAR	DIAGRAM, GENSET SCHEMATIC		
ANG TOL ± 1.0° — SCALE 1/1	THIS DOCUMENT AND THE INFORMATION SHOWN THEREON IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN WHOLE OR IN ELECTRONIC FORM, REPRODUCED OR NOT MADE, OR USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.	DATE 20NOV15	SITE CODE PGF	SIZE E	A054B421 — CAD SHEET 1 of 5
		FOR INTERPRETATION, TYPICAL USED ON DIMENSIONING AND TOLERANCING, USE ASME Y14.5-2009	ARROW		

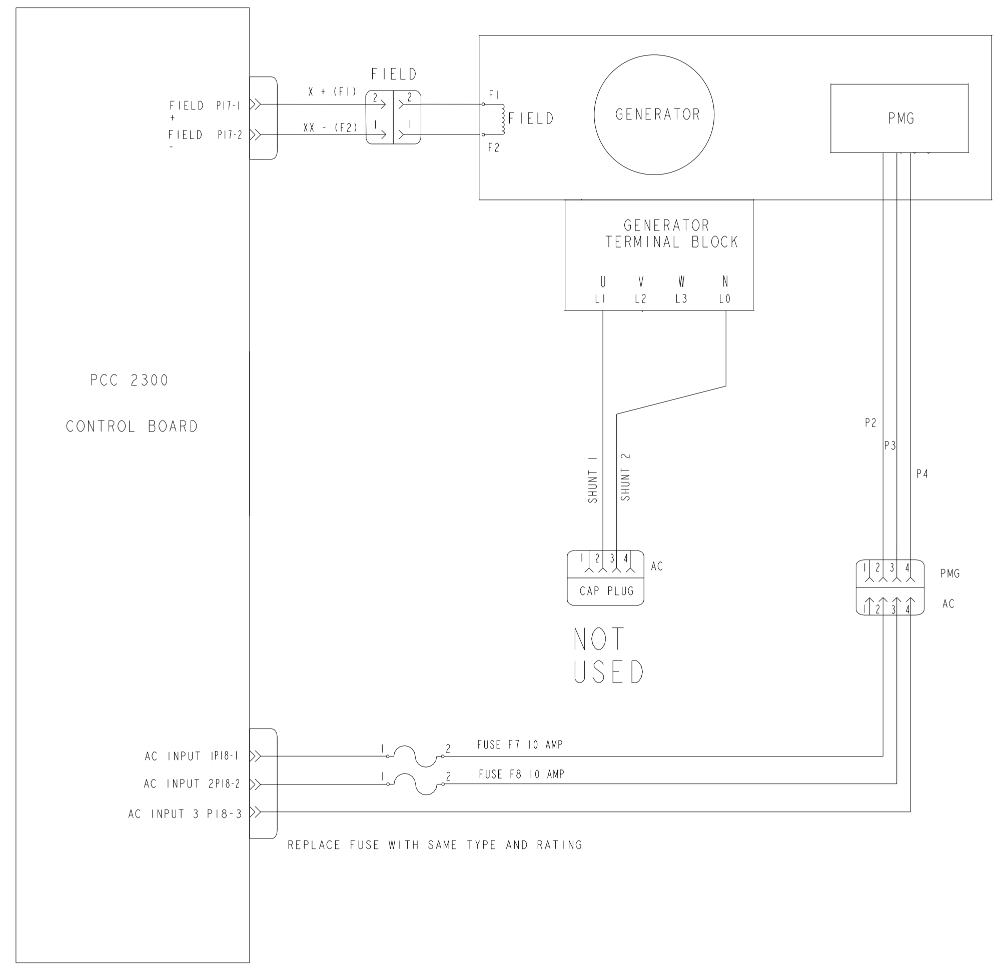
Drawing Name: A054B422 Revision: E
Part Name: A054B421 Revision: E
ECO-181411 Sheet 1 of 6


(REPLACE FUSE WITH SAME TYPE AND RATING)
FUSE F1 20AMP
FUSE F2 10AMP
FUSE F4 10AMP
FUSE F5 1AMP
FUSE F3 10AMP
PWR-1 CONTROL B+
PWR-2 KEY SW,LCL/HMI B+
PWR-3 CO2,CO5 PWR
PWR-4 STARTER B+
PWR-13 SWITCHED B+
PWR-5 CONTROL GND
PWR-6 CRANK
SIG-2 CAN SHIELD
SIG-3 CAN +
SIG-4 CAN -
PWR-8 KEY SWITCH
PWR-9 CO2 PWR
PWR-10 CO5 PWR
SIG-5 LCL SIG
SIG-6 LCL B+
SPLICE 42
SPLICE 31
SPLICE 32
SPLICE 33
SPLICE 35
SPLICE 36
R1 120 ohm
K4 STARTER RELAY
K3 KEY SWITCH RELAY
K2 RUN RELAY
SEE SHEET 1
SEE SHEET 1
J20-9 B + CONTROL B+
J20-10 B + CONTROL B+
J20-20 B + CONTROL B+
J20-21 B + CONTROL B+
J20-1 B - CHASSIS GROUND
J20-2 B - CONTROL GROUND
J20-4 B - CONTROL GROUND
J20-7 B - CONTROL GROUND
J20-12 B - CONTROL GROUND
J20-15 STARTER RELAY LS DRIVER
J20-13 RELAY COIL B+
J11-17 CAN SHIELD
J11-20 CAN HIGH
J11-19 CAN LOW
J11-21 KEY SWITCH LS DRIVER
PCC 2300
A053T067
J20-3 RUN RELAY LS DRIVER
J20-17 LOW COOLANT LEVEL SIGNAL (configurable input #3)
J20-18 LOW FUEL SIGNAL (configurable input #6)
J20-19 RUPTURE BASIN SWITCH (configurable input #12)
TB2 SEE SHEET 4
TB4 SEE SHEET 4
Customer Switched B+ 10 amp
See Sheet 4
LOCAL E-STOP INPUT J25-2
GND J25-6
RELAY CNTL B+ J11-22
GND TB15-1
TB15-2
DATA A TB15-3
DATA B TB15-4
WAKEUP TB15-5
P3
SERVICE CONNECTOR
FOR AUTHORIZED PERSONNEL ONLY
PCC NET-A J25-4
PCC NET-B J25-3
WAKEUP J25-5
RETURN J25-8
MANUAL J25-10
AUTO J25-11
B+ J25-12
SPLICE 37
SPLICE 38
SPLICE 39
SPLICE 40
SPLICE 41
K3-6
PE-1 JE-1
PE-2 JE-2
J25-2
J25-6
J11-22
LOCAL E-STOP
P1 J1
J29
1 RS485+
2 RS485-
3 WAKEUP
4 AUTO
5 RTN
6 RUN
7
8 LAMP
J28
1 B+
2
3 B-
4
320 OPERATOR PANEL (4- BUTTON)
(OPTION)
J1
3 RS485+
4 RS485-
5 WAKEUP
J6
1 B+
2 B-
HMI 114
BARGRAPH
PANEL LIGHT
P40
J40
PL-2 PL-1
LEGEND
CONTROL HARNESS
A053R492
DWN C.BADGUJAR
CHD M.TULADHAR
APVD M.TULADHAR
DATE 20NOV15
DO NOT SCALE PRINT
CUMMINS POWER GENERATION
DIAGRAM,GENSET SCHEMATIC
ARROW
PGF
A054B421
ECO-181411
01NOV18

REL NO	REV	NO	REVISION	DWN	CKD	APVD	DATE
ECO-181411	E	--	---	PT	MT	M.TULADHAR	01NOV18



SHUNT EXCITATION CONFIGURATION



PERMANENT MAGNET GENERATOR EXCITATION CONFIGURATION

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS

DIM: X ± 1; .X ± 0.8; .XX ± 0.38

HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13

ANG TOL ± 1.0° SCALE 1/1

SIM TO .

DO NOT SCALE PRINT

DWN C_BADGUJAR
CKD M_TULADHAR
APVD M_TULADHAR
DATE 20NOV15

FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5-2009

FIRST USED ON ARROW

SITE CODE PGF

CUMMINS POWER GENERATION

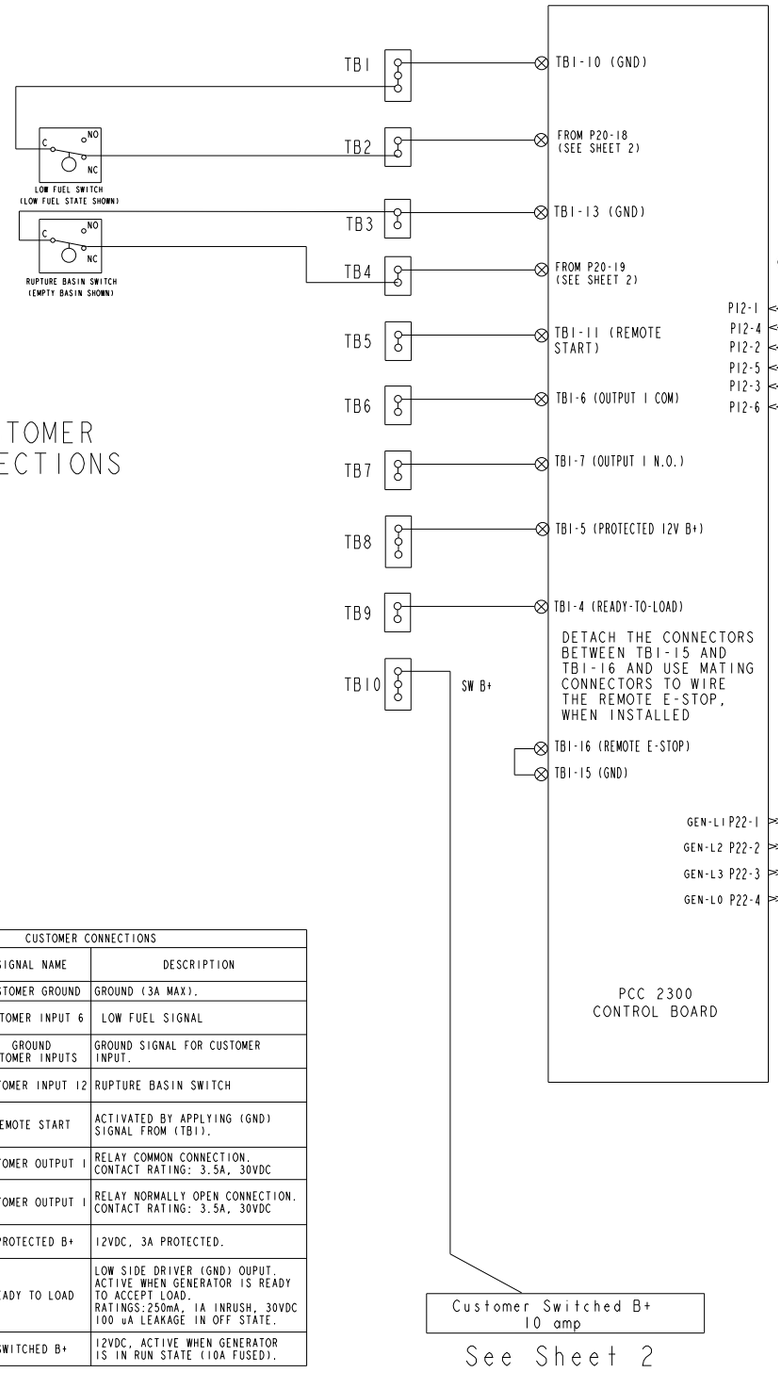
DIAGRAM, GENSET SCHEMATIC

DWG SIZE E A054B421 CAD SHEET 3 OF 5

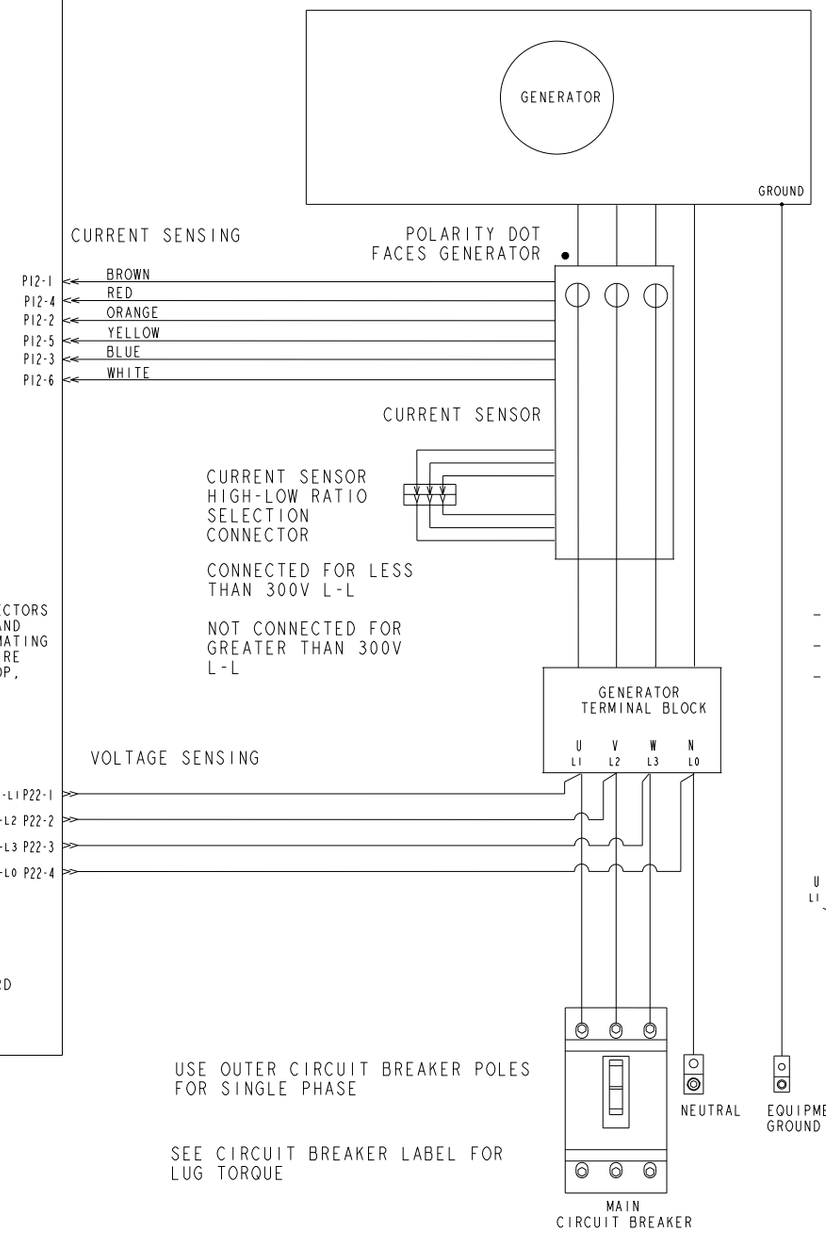
PTC® Creo® Parametric

REL NO	REV	NO	REVISION	DRN	CKD	APVD	DATE
ECO-181411	E	--	---	PT	MT	M.TULADHAR	01NOV18

CUSTOMER CONNECTIONS

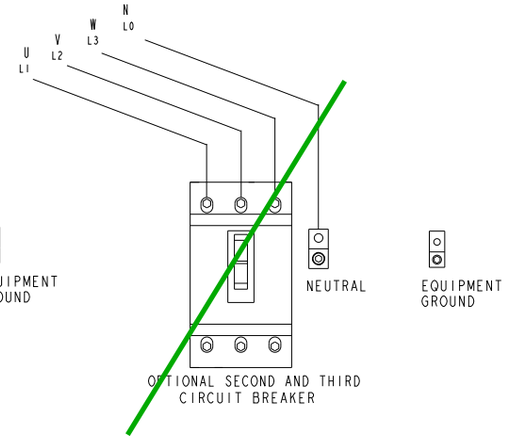


CUSTOMER CONNECTIONS		
TERMINAL NAME	SIGNAL NAME	DESCRIPTION
TB1	CUSTOMER GROUND	GROUND (3A MAX).
TB2	CUSTOMER INPUT 6	LOW FUEL SIGNAL
TB3	GROUND CUSTOMER INPUTS	GROUND SIGNAL FOR CUSTOMER INPUT.
TB4	CUSTOMER INPUT 12	RUPTURE BASIN SWITCH
TB5	REMOTE START	ACTIVATED BY APPLYING (GND) SIGNAL FROM (TB1).
TB6	CUSTOMER OUTPUT 1	RELAY COMMON CONNECTION. CONTACT RATING: 3.5A, 30VDC
TB7	CUSTOMER OUTPUT 1	RELAY NORMALLY OPEN CONNECTION. CONTACT RATING: 3.5A, 30VDC
TB8	PROTECTED B+	12VDC, 3A PROTECTED.
TB9	READY TO LOAD	LOW SIDE DRIVER (GND) OUPUT. ACTIVE WHEN GENERATOR IS READY TO ACCEPT LOAD. RATINGS:250mA, 1A INRUSH, 30VDC 100 uA LEAKAGE IN OFF STATE.
TB10	SWITCHED B+	12VDC, ACTIVE WHEN GENERATOR IS IN RUN STATE (10A FUSED).

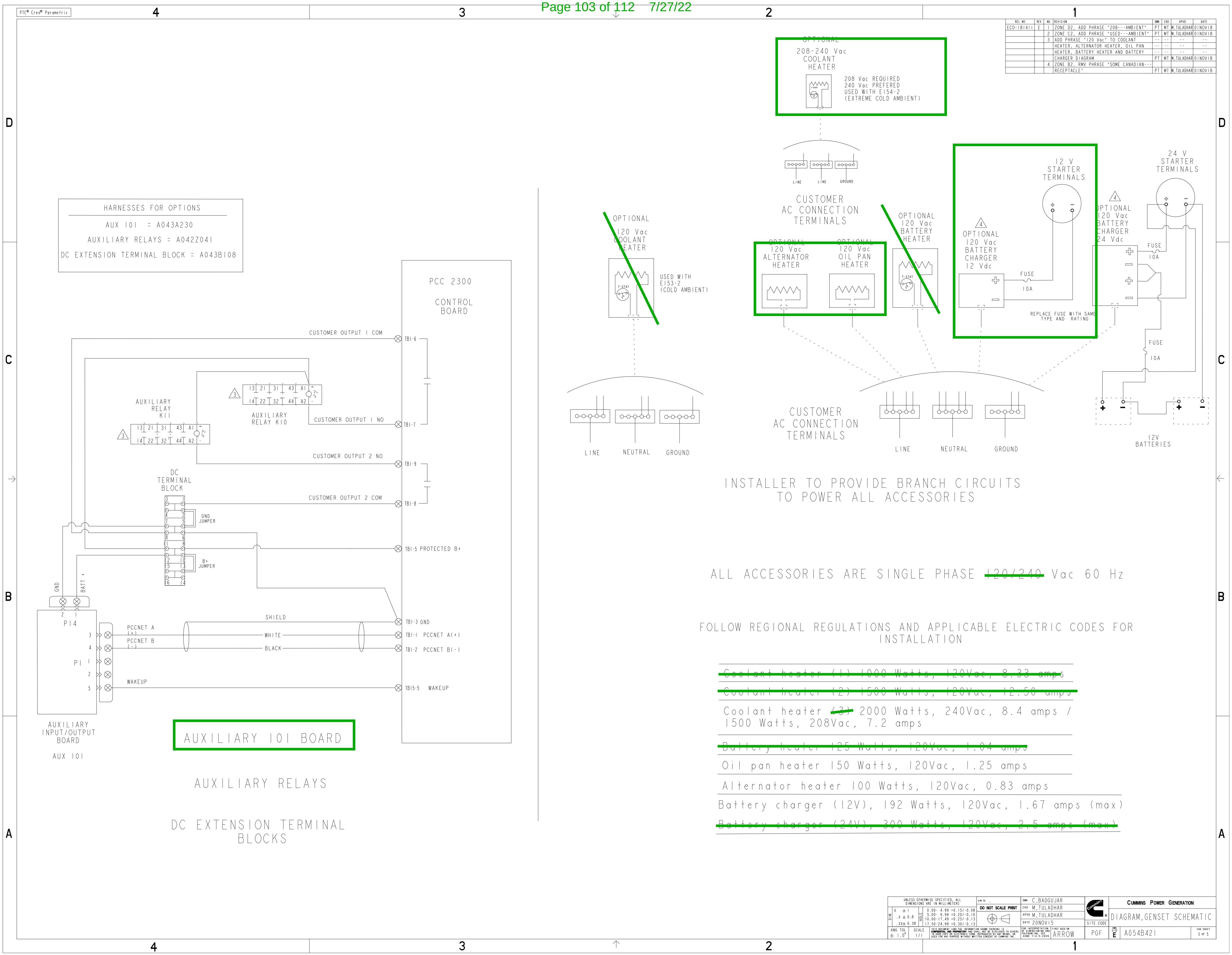


SEE DRAWING A048V210 FOR:

- VOLTAGE SENSING CONNECTION
- GENERATOR CONNECTION
- CURRENT SENSOR INSTALLATION

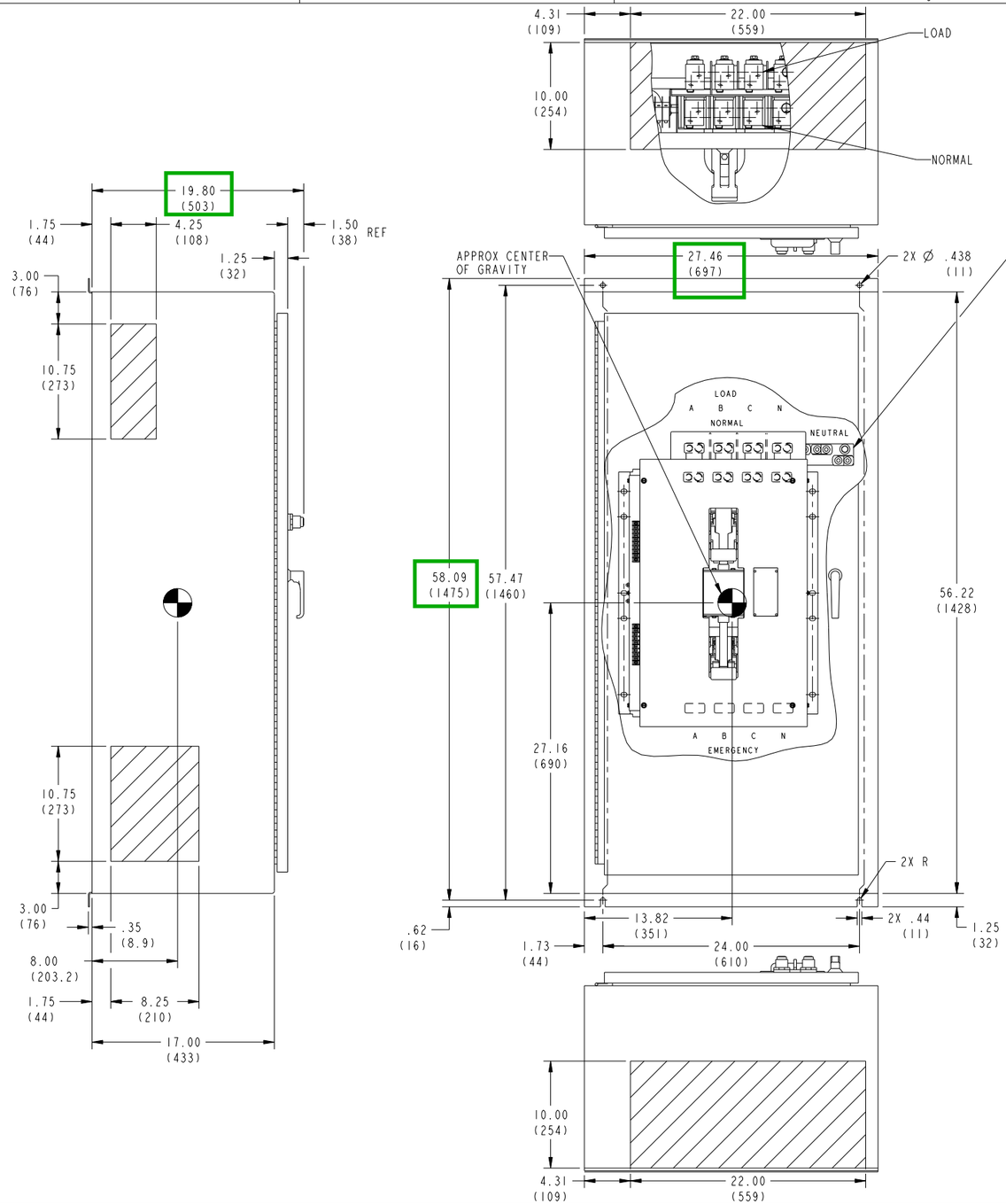


UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS
DIM: X ±1, .X ±0.8, .XX± 0.38
ROUND: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13
ANG TOL ± 1.0° | SCALE 1/1
DO NOT SCALE PRINT
THIS DOCUMENT AND THE INFORMATION SHOWN THEREON IS CONFIDENTIAL AND PROPRIETARY AND SHALL NOT BE DISCLOSED TO OTHERS IN WHOLE OR IN PART WITHOUT THE WRITTEN CONSENT OF CUMMINS INC. IT SHALL NOT BE USED FOR ANY PURPOSE WITHOUT WRITTEN CONSENT OF CUMMINS INC.
DRN C.BADGUJAR | CKD M.TULADHAR | APVD M.TULADHAR | DATE 20NOV15
INTERPRETATION PER ASME Y14.5-2009
PRINT USED ON ARROW
SITE CODE PGF
CUMMINS POWER GENERATION
DIAGRAM,GENSET SCHEMATIC
REV E
A054B421
CAD SHEET 4 of 5


HARNESSES FOR OPTIONS
AUX 101 = A043A230
AUXILIARY RELAYS = A042Z041
DC EXTENSION TERMINAL BLOCK = A043B108
PCC 2300
CONTROL BOARD
CUSTOMER OUTPUT 1 COM
CUSTOMER OUTPUT 1 NO
CUSTOMER OUTPUT 2 NO
CUSTOMER OUTPUT 2 COM
AUXILIARY RELAY K11
AUXILIARY RELAY K10
DC TERMINAL BLOCK
GND JUMPER
B+ JUMPER
TB1-5 PROTECTED B+
SHIELD
WHITE
BLACK
PCCNET A
PCCNET B
WAKEUP
TB1-3 GND
TB1-1 PCCNET A(+)
TB1-2 PCCNET B(-)
TB15-5 WAKEUP
AUXILIARY INPUT/OUTPUT BOARD
AUX 101
AUXILIARY 101 BOARD
AUXILIARY RELAYS
DC EXTENSION TERMINAL BLOCKS
OPTIONAL
208-240 Vac COOLANT HEATER
208 Vac REQUIRED
240 Vac PREFERED
USED WITH E154-2
(EXTREME COLD AMBIENT)
OPTIONAL
120 Vac COOLANT HEATER
USED WITH E153-2
(COLD AMBIENT)
CUSTOMER AC CONNECTION TERMINALS
OPTIONAL 120 Vac ALTERNATOR HEATER
OPTIONAL 120 Vac OIL PAN HEATER
OPTIONAL 120 Vac BATTERY HEATER
OPTIONAL 120 Vac BATTERY CHARGER 12 Vdc
OPTIONAL 120 Vac BATTERY CHARGER 24 Vdc
12 V STARTER TERMINALS
24 V STARTER TERMINALS
FUSE 10A
REPLACE FUSE WITH SAME TYPE AND RATING
12V BATTERIES
LINE
NEUTRAL
GROUND
INSTALLER TO PROVIDE BRANCH CIRCUITS TO POWER ALL ACCESSORIES
ALL ACCESSORIES ARE SINGLE PHASE ~~120/240~~ Vac 60 Hz
FOLLOW REGIONAL REGULATIONS AND APPLICABLE ELECTRIC CODES FOR INSTALLATION
~~Coolant heater (1) 1000 Watts, 120Vac, 8.33 amps~~
~~Coolant heater (2) 1500 Watts, 120Vac, 12.50 amps~~
Coolant heater ~~(3)~~ 2000 Watts, 240Vac, 8.4 amps / 1500 Watts, 208Vac, 7.2 amps
~~Battery heater 125 Watts, 120Vac, 1.04 amps~~
Oil pan heater 150 Watts, 120Vac, 1.25 amps
Alternator heater 100 Watts, 120Vac, 0.83 amps
Battery charger (12V), 192 Watts, 120Vac, 1.67 amps (max)
~~Battery charger (24V), 300 Watts, 120Vac, 2.5 amps (max)~~
DWN C.BADGUJAR
CHKD M.TULADHAR
APVD M.TULADHAR
DATE 20NOV15
DO NOT SCALE PRINT
CUMMINS POWER GENERATION
DIAGRAM, GENSET SCHEMATIC
ARROW
PGF
E
A054B421

Pro/ENGINEER

REL NO	LTR	NO	REVISION	DRN	CKD	APVD	DATE
ECO-104169	C	1	REDRAWN IN PRO-E WITH CHANGES	NVB	LJY	L.SMITH	23DEC11
		2	ZONE B2, REVISED NOTE 7	NVB	LJY	L.SMITH	23DEC11
		3	ZONE B2, REVISED NOTE 8, SEE ECO	NVB	LJY	L.SMITH	23DEC11



NOTES:

1. U.L. CABINET:
   TYPE 3R, OUTDOOR RAINPROOF
   TYPE 12, INDOOR DUSTTIGHT, DRIPTIGHT
   (EQUIVALENT TO NEMA 3R AND 12)

2. APPROX WEIGHT: 290 lbs
   MASS: 132 kg

3. DIMENSIONS IN ( ) ARE MILLIMETERS.

4. LUG CAPACITY: 300,400 AMP
   (QTY 1 WIRE) 3/0-600 (95-240)MCM CU-AL
   (QTY 2 WIRES) 3/0-250 (25-120) MCM CU-AL
   LUG CAPACITY: 600 AMP
   (QTY 2 WIRES) 250-500 (120-240) MCM CU

5. USE SEPARATE CONDUITS FOR CONTROL WIRING & POWER WIRING. DO NOT COMBINE.

6. SHADED AREA INDICATES WIRING & CABLE ENTRANCE AREA. DO NOT INSTALL OUTSIDE OF SHADED AREA.

7. WIRE BENDING SPACE CONFORMS TO NATIONAL ELECTRICAL CODE (NFPA70).

8. REFER TO THE NATIONAL ELECTRICAL CODE FOR MINIMUM CLEAR SPACE IN FRONT OF THIS ENCLOSURE.

9. 4 POLE SWITCHED NEUTRAL TRANSFER SWITCH SHOWN. A SOLID NEUTRAL BAR IS PROVIDED WITH 3 POLE TRANSFER SWITCHES.

3 AND 4 POLE

UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS
DIM: X ±, .X ±, .XX±
HOLE: 0.00- 4.99 +0.15/-0.08; 5.00- 9.99 +0.20/-0.10; 10.00-17.49 +0.25/-0.13; 17.50-24.99 +0.30/-0.13
ANG TOL: ±
SCALE: 3/16
SIM TO 0310_1316
DO NOT SCALE PRINT
- CONFIDENTIAL - PROPERTY OF CUMMINS POWER GENERATION GROUP
DRN L.KAPLAN
CKD L.SMITH
APVD L.SMITH
DATE 25MAY99
FIRST USED ON OTPC 300-600 A
FOR INTERPRETATION OF DIMENSIONING AND TOLERANCING, SEE ASME Y14.5M-1994
SITE CODE PGF
CUMMINS POWER GENERATION
OUTLINE-CONTROL BOX
DWG SIZE D
0310_1315
SHEET 1 OF 1
DWG REV C

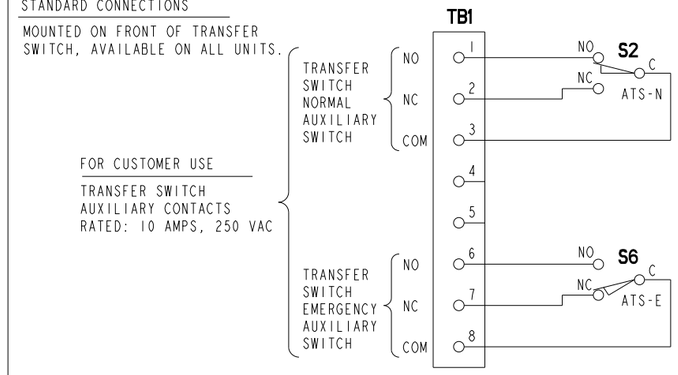
CUSTOMER CONNECTIONS (STANDARD)

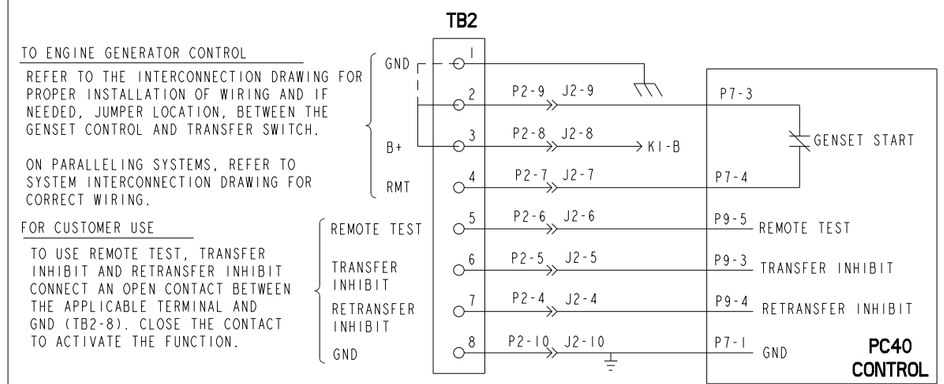
STANDARD CONNECTIONS

MOUNTED ON FRONT OF TRANSFER SWITCH, AVAILABLE ON ALL UNITS.

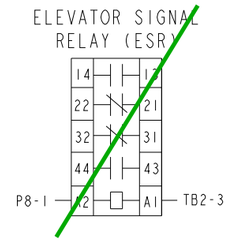
FOR CUSTOMER USE

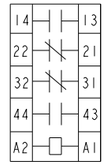
TRANSFER SWITCH AUXILIARY CONTACTS RATED: 10 AMPS, 250 VAC



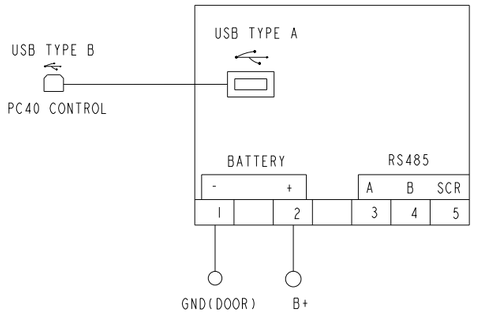


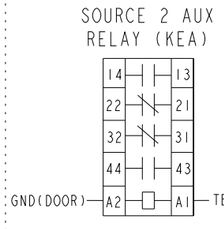
CUSTOMER CONNECTIONS (OPTIONAL)

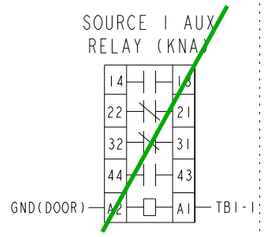




COMMI - COMMUNICATION MODULE







S2,S3,S4 AND S5 NORMAL POSITION AUXILIARY SWITCH
S6,S7,S8 AND S9 EMERGENCY POSITION AUXILIARY SWITCH
K1 OPEN EMERGENCY RELAY
K2 OPEN NORMAL RELAY
K3 CLOSE RELAY
CB MAIN CIRCUIT BREAKER
CB1 CIRCUIT BREAKER
M1 LINEAR MOTOR
C1 MOTOR RUN CAPACITOR
COMM1 USB TO RS485 COMMUNICATIONS DEVICE

NOTES:

1. TB1 AND TB2 ARE MOUNTED ON THE FRONT OF THE TRANSFER SWITCH.
2. ALL DEVICES ARE SHOWN DE-ENERGIZED, WITH THE TRANSFER SWITCH CLOSED TO NORMAL. 4 POLE TRANSFER SWITCH SHOWN. ON 3 POLE MODELS THE SWITCHED NEUTRAL POLE IS REPLACED WITH A SOLID NEUTRAL BAR.
3. FOR SINGLE PHASE UNITS:
   120/240V, 3 WIRE - CONNECT POWER CABLES TO A AND C
   120V L-N, 2 WIRE - CONNECT POWER CABLES TO A AND NEUTRAL.
4. FOR OTECSE MODEL, LIST OF MAIN CIRCUIT BREAKER TYPE SHOWN BELOW:
   SWITCH RATING: MAIN CIRCUIT BREAKER TYPE
   40-125A SQUARE D, TYPE 'HG'.
5. WIRING FOR RELAYS KNA AND KEA IS TYPICAL. POWER CONNECTIONS MAY VARY SLIGHTLY IF MORE OR LESS RELAYS ARE USED.

⚠6 KGS PROVIDED UNWIRED FOR ADDITIONAL GENSET START WIRING LOGIC TO MEET ANY LOCAL CODE OR INSTALLATION REQUIREMENTS. REFER TO THE INTERCONNECTION DRAWING FOR PROPER INSTALLATION OF WIRING ON SHEET 3.

⚠7 THE WIRE FROM COMM1-(+) IS CONNECTED TO THE WIRE GOING TO P7-2 ON SHEET 3.

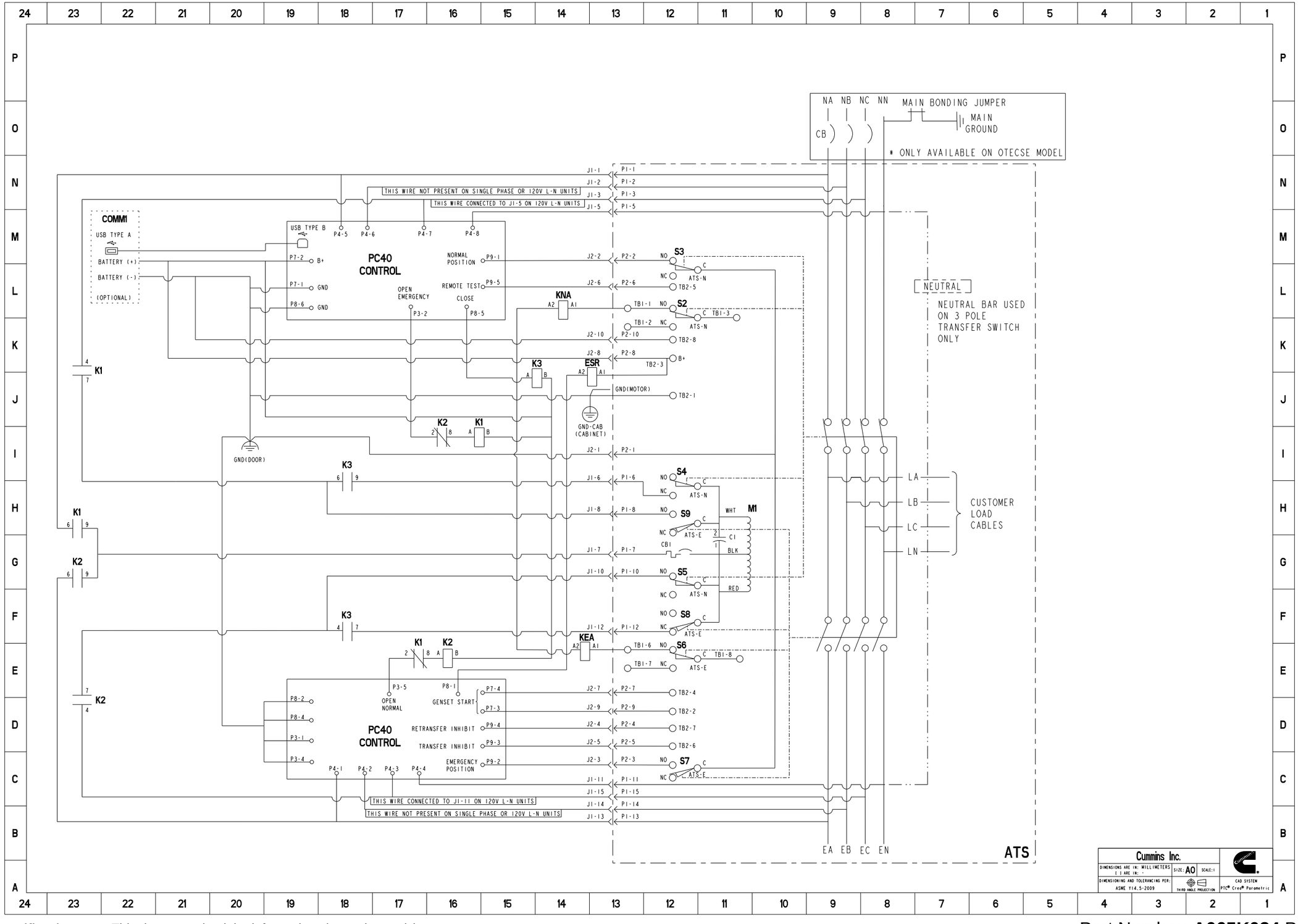
⚠8 ON ALL SINGLE PHASE, 2 OR 3 WIRE UNITS:
THE WIRE CONNECTED FROM J1-2 TO P4-6 IS NOT PRESENT.
IN ADDITION, ON 120 VOLT L-N, 2 WIRE UNITS:
THE WIRE CONNECTED FROM K1-4 TO J1-3 WILL BE CONNECTED FROM K1-4 TO J1-5 AND
THE WIRE CONNECTED FROM K2-4 TO J1-15 WILL BE CONNECTED FROM K2-4 TO J1-11
ON SHEET 3.

9. (NOTE REMOVED)
10. ELEVATOR SIGNAL RELAY SHOWN DE-ENERGIZED. RELAY CHANGES STATE DURING THE ELEVATOR DELAY TIME.

UTILITY TO GENSET
3 AND 4 POLE
OTEC 40-600 AMP & OTECSE 40-125 AMP
120 VOLT 1 PHASE L-N
240 VOLT 1 PHASE
190 VOLT 3 PHASE
208 VOLT 3 PHASE
220 VOLT 3 PHASE
240 VOLT 3 PHASE
380 VOLT 3 PHASE
415 VOLT 3 PHASE
440 VOLT 3 PHASE
480 VOLT 3 PHASE

OPTIONS:
COMMUNICATION MODULE
ESR: ELEVATOR SIGNAL RELAY
KGS: GENSET START AUX RELAY
KEA: SOURCE 2 AUX RELAY
KNA: SOURCE 1 AUX RELAY

MODEL/PLATFORM: OTEC	THIS PART IS SIMILAR TO: 0630-2766
Cummins Inc.	
DIMENSIONS ARE IN: MILLIMETERS [ ] ARE IN: -	SIZE: A0 SCALE:1
DIMENSIONING AND TOLERANCING PER: ASME Y14.5-2009	THIRD ANGLE PROJECTION
	CAD SYSTEM PTC® Creo® Parametric



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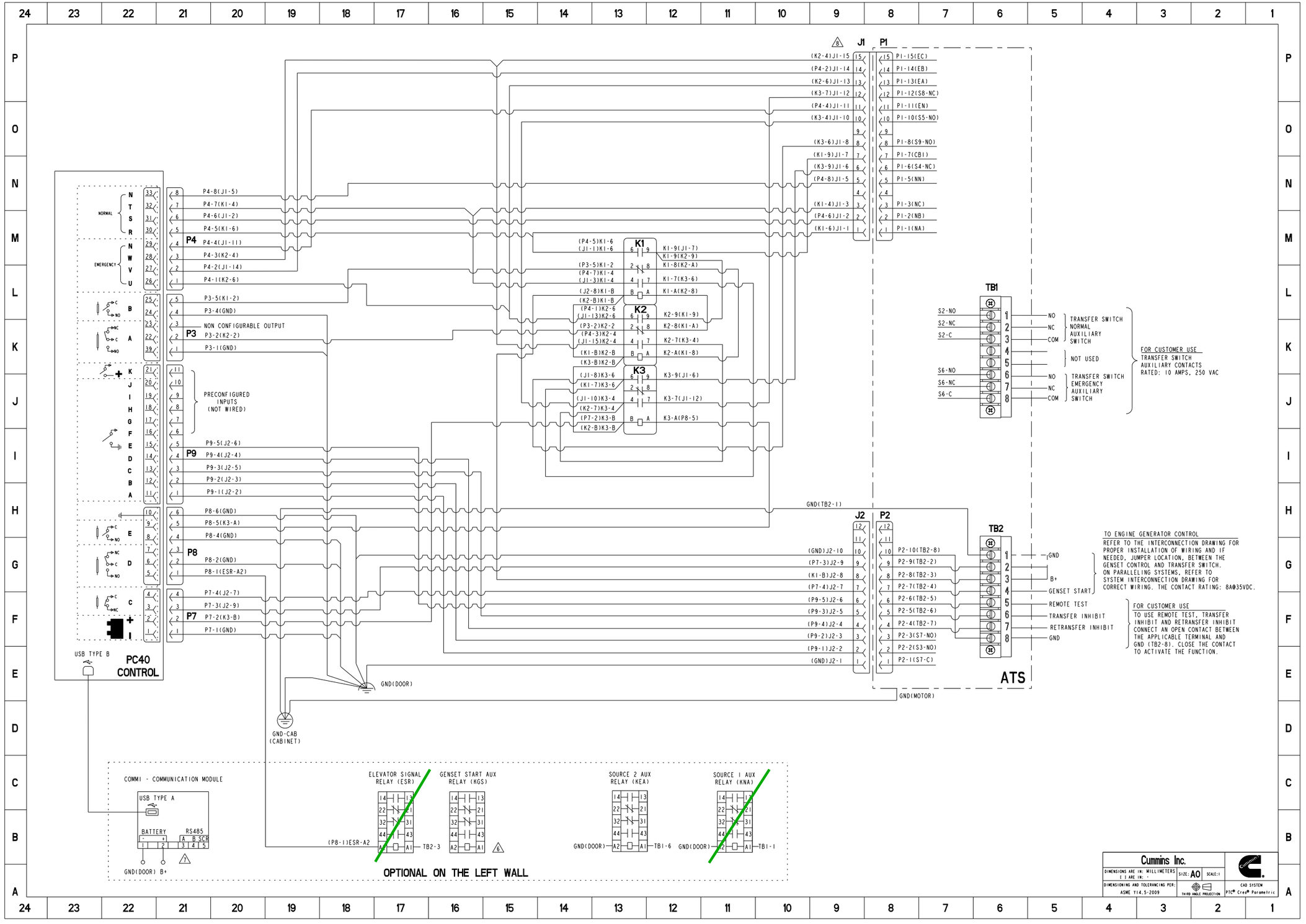
Part Number: **A065K034** Part Revision: **C**
Part Name: **DIAGRAM,SCHEMATIC**
Drawing Category: **Detail** State: **Released**

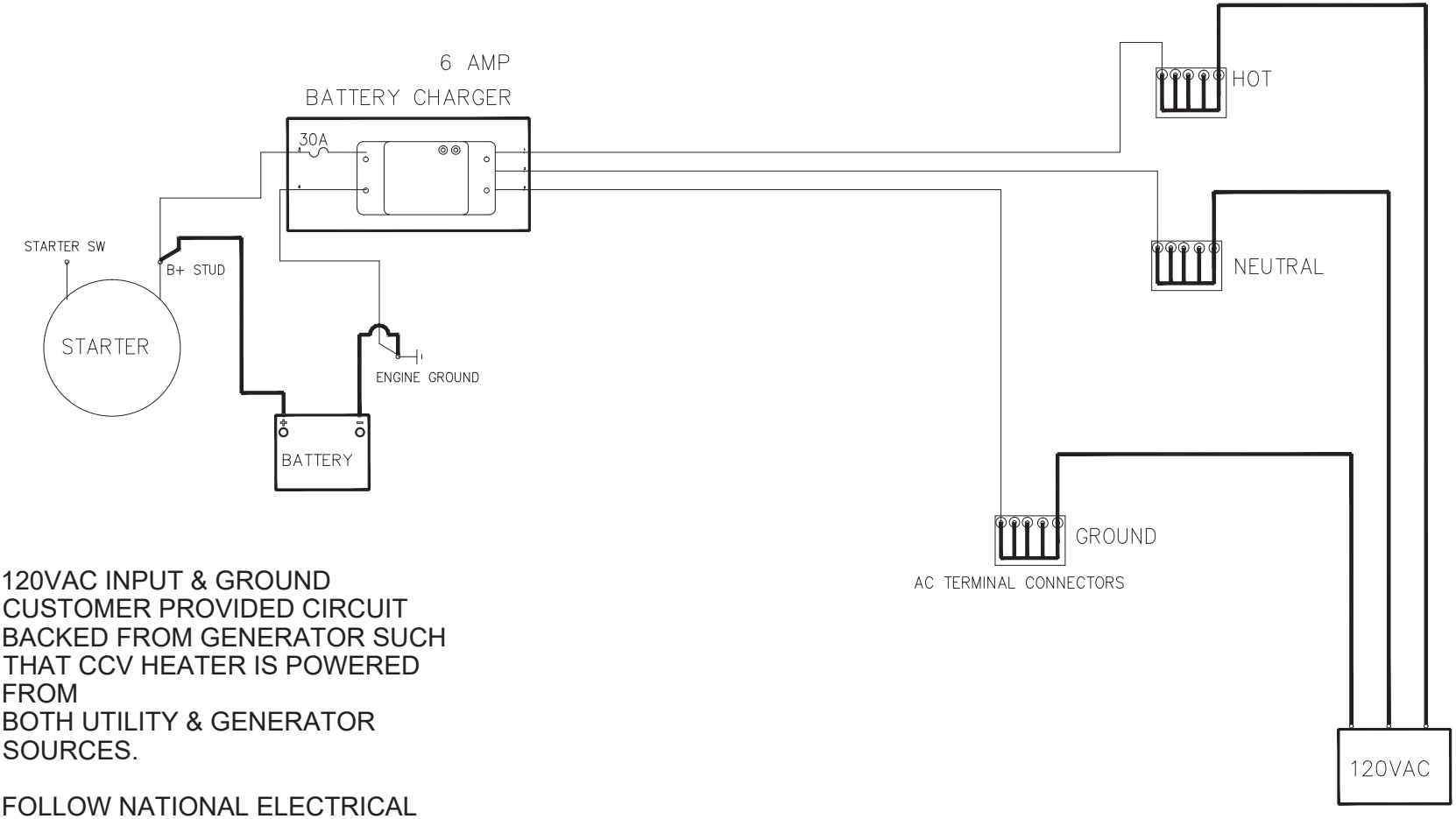


Document Generated: **15DEC2021 17:27 GMT**

Part Number: **A065K034** Part Revision: **C**

Part Name: **DIAGRAM,SCHEMATIC**

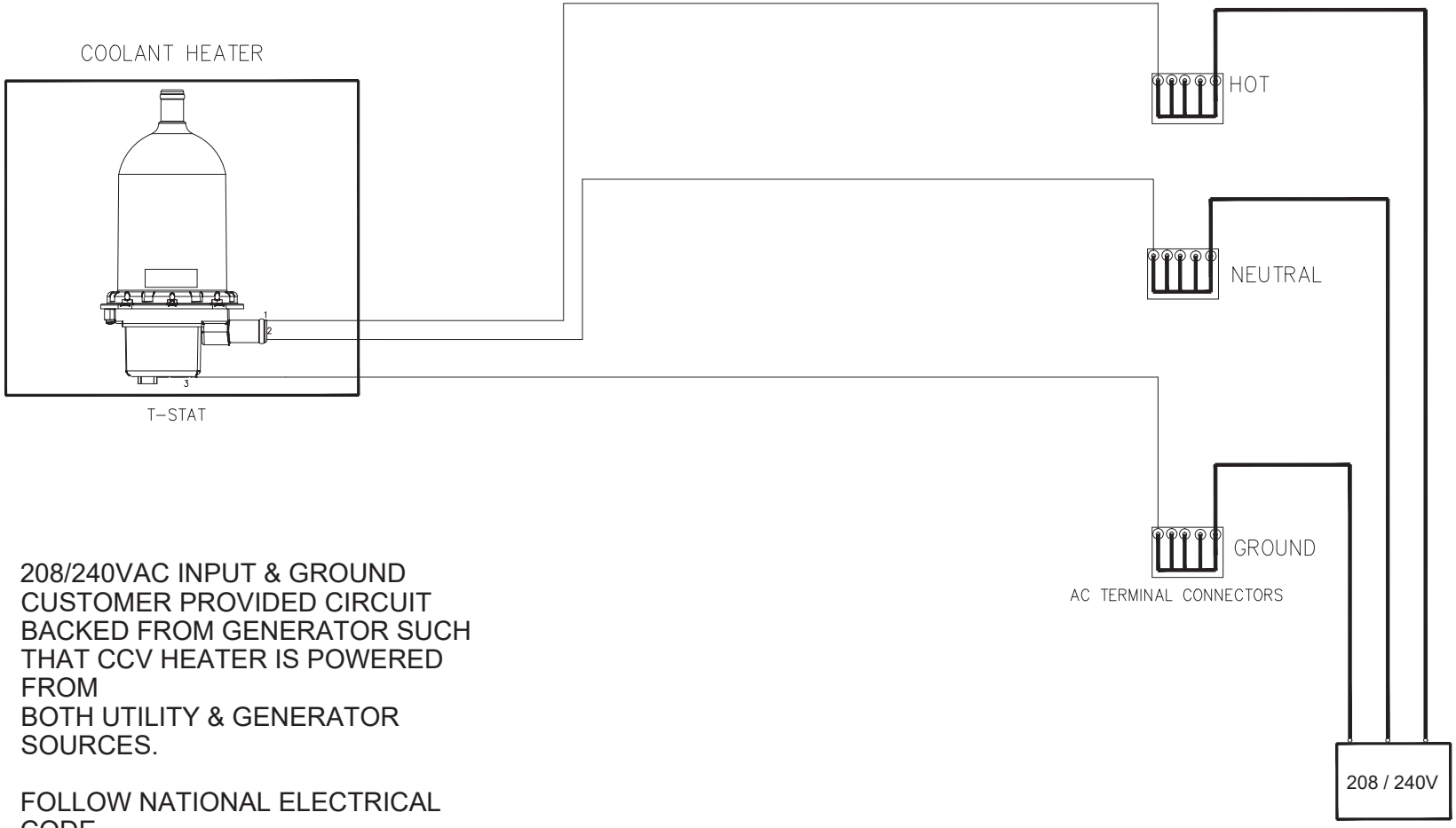
Drawing Category: **Detail** State: **Released**



120VAC INPUT & GROUND
CUSTOMER PROVIDED CIRCUIT
BACKED FROM GENERATOR SUCH
THAT CCV HEATER IS POWERED
FROM
BOTH UTILITY & GENERATOR
SOURCES.

FOLLOW NATIONAL ELECTRICAL
CODE
FOR INSTALLATION.

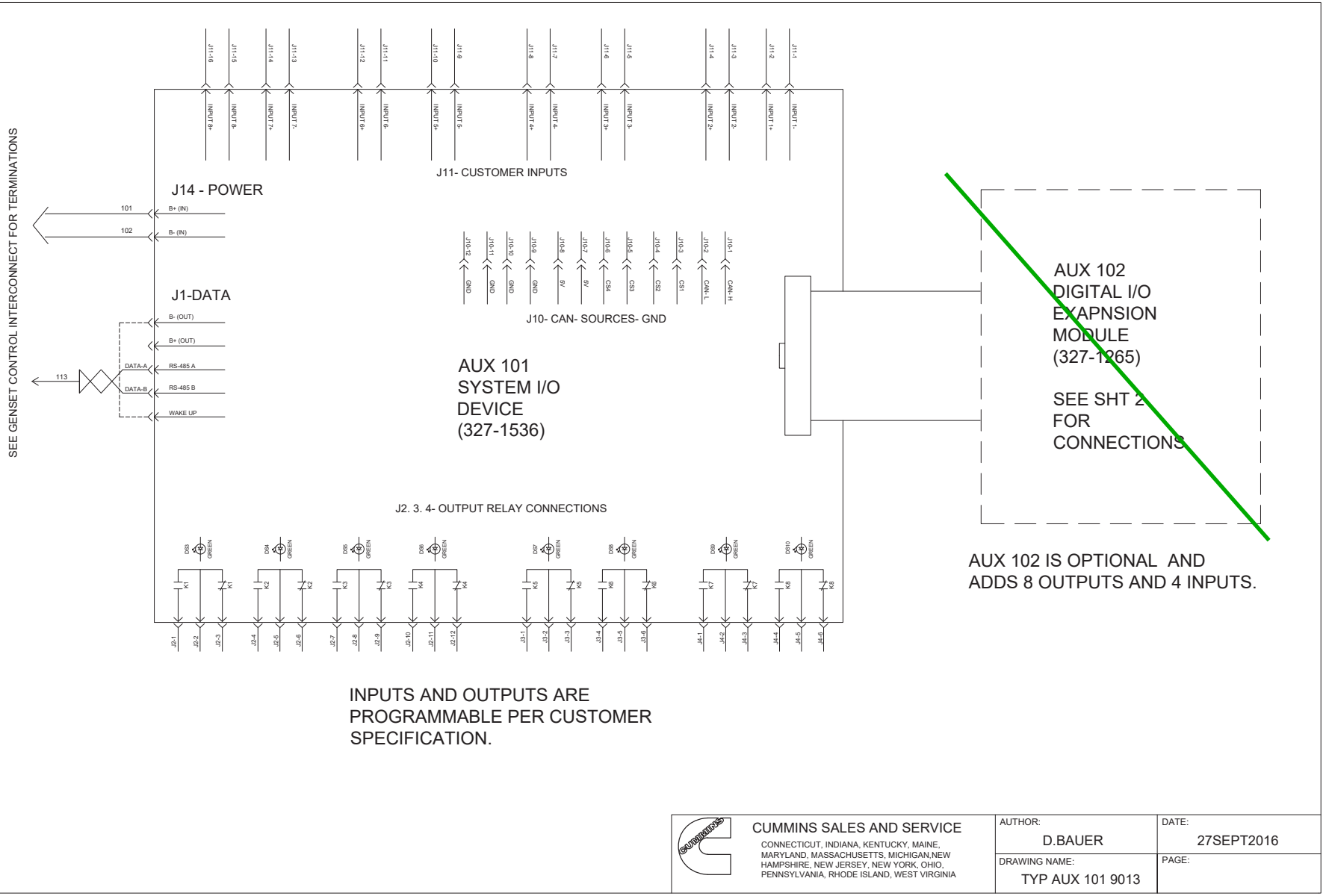
CUMMINS SALES AND SERVICE CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA	AUTHOR: D.BAUER	DATE: 27SEPT2016
	DRAWING NAME: CONNECT SERIES BATT CHARGER 9030	PAGE:



208/240VAC INPUT & GROUND
CUSTOMER PROVIDED CIRCUIT
BACKED FROM GENERATOR SUCH
THAT CCV HEATER IS POWERED
FROM
BOTH UTILITY & GENERATOR
SOURCES.

FOLLOW NATIONAL ELECTRICAL
CODE
FOR INSTALLATION.

CUMMINS SALES AND SERVICE CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA	AUTHOR: D.BAUER	DATE: 27SEPT2016
	DRAWING NAME: CONNECT SERIES BLOCK HEATER 9029	PAGE:



CUMMINS SALES AND SERVICE CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA	AUTHOR: D.BAUER	DATE: 27SEPT2016
	DRAWING NAME: TYP AUX 101 9013	PAGE:

WIRE SIZE (AWG)	DISTANCE IN FEET (ONE WAY)									
	A	B		C		D		E	
ATS with or without battery charger	CONTROL WIRING	2/ 3.5 AMP BATT CHG		10 AMP BATT CHG		12/15 AMP BATT CHG		20 AMP BATT CHG	
		24V	12V	24V	12V	24V	12V	24V	12V
16	1000	90	50	-	-	-	-	-	-
14	1600	150	80	20	5	20	5	-	-
12	2400	225	125	30	10	30	10	-	-
10	4000	350	200	50	15	50	15	30	15
8	-	600	300	80	25	80	25	50	25
6	-	1000	500	125	40	125	40	80	40

CUMMINS SALES AND SERVICE

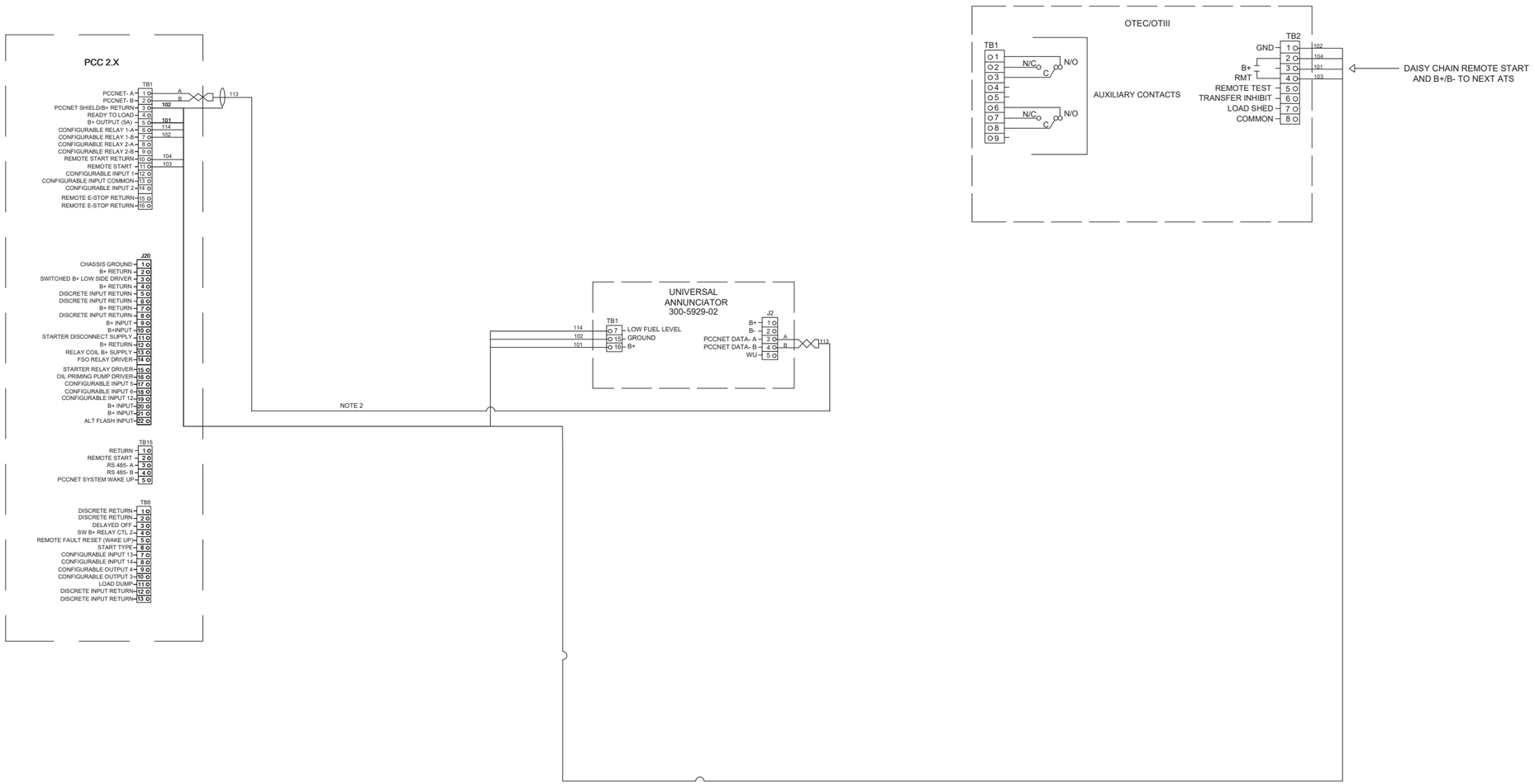
CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA

AUTHOR: D.BAUER

DATE: 27SEPT2016

DRAWING NAME: WIRE SIZE 9005

PAGE:



NOTES:
1.) LONWORKS RECOMMEND CABLE TYPE: BELDEN 8471 UNSHIELDED TWISTED PAIR
2.) PCCNET AND RS485 RECOMMENDED CABLE TYPE: BELDEN 9729 SHIELDED TWISTED PAIR
3.) MODLON GATEWAY TO PC500-550 CONNECTION CABLE CPG PN: A040T087
4.) USB HOST IS USED TO ATTACH AN EXTERNAL USB DRIVE TO EXTEND THE PC 500-550 MEMORY
5.) SD CARD SLOT IS USED TO EXTEND THE PC 500-550 MEMORY
6.) EITHER USB HOST OR SD CARD CAN BE USED AT A TIME, NOT BOTH
7.) USB DEVICE IS USED BY A PC TO SETUP THE PC 500-550
8.) PULL 20% MORE CONDUCTORS FOR SPARES

CUMMINS SALES AND SERVICE

CONNECTICUT, INDIANA, KENTUCKY, MAINE, MARYLAND, MASSACHUSETTS, MICHIGAN,NEW HAMPSHIRE, NEW JERSEY, NEW YORK, OHIO, PENNSYLVANIA, RHODE ISLAND, WEST VIRGINIA

AUTHOR:	DATE:
D.BAUER	10MARCH2021
DRAWING NAME: INT 2.X 9023	PAGE:

APPENDIX G

DRAFT CONTRACT

To be issued by Addendum