Engineering & Project Excellence

VIA US AND ELECTRONIC MAIL

6/1/2017

Robert Stein
Chairman
The Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

Re: The United Illuminating Company's Notice of Exempt Modification Pursuant to R.C.S.A. § 16-50j-58 to the Following Existing Energy Facility: **104 Armstrong Road, Shelton CT** ("Notice of Exempt Modification")

Dear Chairman Stein:

Pursuant to Regulations of Connecticut State Agencies ("R.C.S.A.") §16-50j-58, The United Illuminating Company ("UI" or "Company") hereby notifies the Connecticut Siting Council (the "Council") of its intent to make exempt modifications to the following substation: 104 Armstrong Road, Shelton CT ("Facility" or "Trap Falls").

As discussed in detail below, after a review of certain UI substations, the Company has determined that increased lighting protection is required at Trap Falls. The results of UI's study are included in Attachment 1.

The $625 filing fee along with 2 copies of this Notice of Exempt Modification are enclosed herewith.

104 Armstrong Road – Trap Falls

The 104 Armstrong Road Facility is located in the Town of Shelton, CT at 41˚16'01.76" and Λ 73˚07'05.06" and is more particularly described in Attachment A.

Aerial Photos of the Facility

Trap Falls Substation. 104 Armstrong Rd, Shelton CT 06484
Source: Google Maps 2017

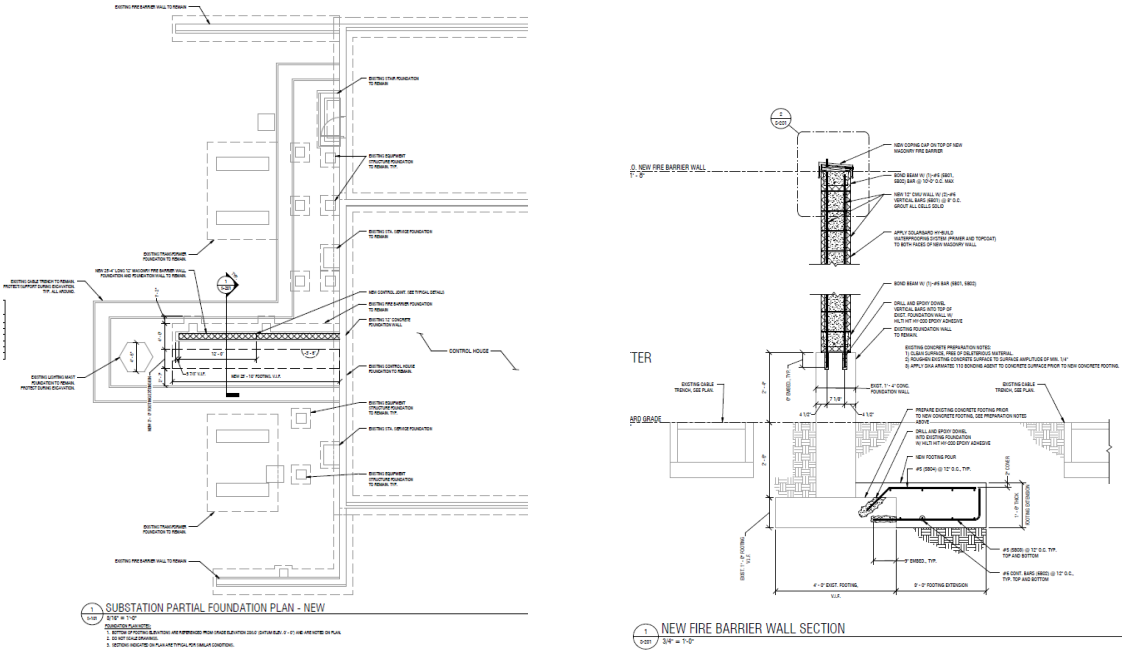
GIS Photos of the Facility

Trap Falls Substation. 104 Armstrong Rd, Shelton CT 06484 (Current)
Source: GIS Lite 4/12/17

Trap Falls Substation

The Company proposes to remove the outer firewalls at Trap Falls Substation in order to install lightning Protection to provide 100% coverage. Currently UI does not have 100% protection on the site therefore it is susceptible to lightning strikes – potentially comprising system reliability and integrity. Additionally, UI proposes to replace the end-of-life station post insulators and add bus fittings to strengthen the bus work. The Company also proposes the replacement of the center firewall due to the structural integrity of the existing wall.

The center firewall is depicted below and in Attachment 5.



Source: Drawings by Labella Associates, April 2017

Current and proposed photos of Trap Falls. *Please note the removal of the outer cheek walls and the proposed lightning masts.*

Trap Falls Substation, Current Site.
Source: All-Points Technology Corporation 4/12/17

Trap Falls Substation, Proposed Site.
Source: All-Points Technology Corporation 4/12/17

Compliance with R.C.S.A. § 16-50j-57(b)

Pursuant to R.C.S.A. §16-50j-57(b), the proposed changes do not constitute a modification to an existing facility that may have a substantial adverse environmental effect and are exempt from the requirement to obtain a certificate pursuant to Section 16-50k of the Connecticut General Statutes. Specifically, consistent with R.C.S.A. § 16-50j-57(b), the proposed changes to the existing site do not:

(A) Extend the boundaries of the site beyond the existing fenced compound;
(B) Increase the height of existing associated equipment;
(C) Increase noise levels at the site boundary by 6 decibels or more, or to levels that exceed state and local criteria;
(D) Impact electric and magnetic field levels at the site boundary in a manner that is inconsistent with the Council's Best Management practices for Electric and Magnetic Fields;
(E) Cause a significant adverse change or alteration in the physical or environmental characteristics of the site; or
(F) Impair the structural integrity of the facility, as determined in a certification provided by a professional engineer licensed in Connecticut, where applicable.

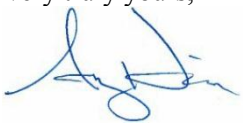
The project would not have a substantial adverse environmental effect or cause a significant adverse change or alteration in the physical or environmental characteristics because:

(A) The proposed changes would be located within the Substation's existing fence line; the Substation's fenced area would not be expanded.
(B) The equipment would be no taller than existing equipment within the Substation. *See* Attachment 3.
(C) There would be no change to the existing television or radio interference resulting from the modifications of the Substation.
(D) Sound-pressure levels at all points along properties lines would continue to meet state regulations set out in R.C.S.A. §§ 22a-69-1 et seq. *See* Attachment 4.
(E) The project work would not affect water resource areas.
(F) UI's review of the Connecticut Department of Energy and Environmental Protection's ("CT DEEP") Natural Diversity Data Base did not identify any state-listed endangered, threatened, or special concern species in the vicinity of the Project.
(G) Electric and Magnetic field levels at the Substation boundary would not change as a result of the modifications.

UI intends to initiate the project, Design Adequacy Group 1, on or after the Council's acknowledgement that the proposed activities are exempt.

Please do not hesitate to contact me at 203-499-2586 should you have any questions regarding this notice.

Very truly yours,



Amy Hicks
Analyst, Permitting & Public Outreach
The United Illuminating Company

cc: The Honorable Mayor Mark A. Lauretti, Town of Shelton
James Morrissey, Attorney, UIL Holdings Corporation
Nathan Hartford, The United Illuminating Company
Jonathan Wolff, The United Illuminating Company

Attachments:
Attachment A: 102 Armstrong Road Property Description
Attachment 1: Scope of Work
Attachment 2: Trap Falls Firewalls Technical Assessment Report
Attachment 3: Trap Falls Visual Analysis Report
Attachment 4: Trap Falls Noise Analysis Report
Attachment 5: Trap Falls Fire Barrier Replacement Drawings
Attachment 6: Design Adequacy – 90 Drawing Set

ATTACHMENTS

Attachment A

102 Armstrong Road, Shelton, Connecticut

Acquired via a Deed at Volume 225 Page 557

Commencing at a point in the Northwesterly line of Armstrong Road also known as Black Rock Road marked by an iron pipe driven into the ground in the Easterly line of the Conn. Light & Power Co. Right of Way and other land now or formerly of Edward Gallant, 403.9 feet to a point marked by an iron pipe set in a stone wall and land now or formerly of Elly Hansen; thence Northeasterly along land now or formerly of said Hansen and following a stone wall 270 feet more or less to a point marked by an iron pipe set in the stone wall and land now or formerly of Ralph Rosemarie Zullo; thence Southeasterly along land now or formerly of said Ralph and Rosemarie Zullo 392.5 feet to a point marked by an iron pipe driven into the ground in the Northwesterly line of Armstrong Road; then Southwesterly along the Northwesterly line of Armstrong Road 661 feet to the point of commencement.

Said Parcel contains 3.6 acres.

Date: June 24, 2016
Project Name: Fault Current Design Adequacy Project – Group 1
Project Number: 801979
Project Manager: Charles Wallis

Summary

Fault current withstand capability is a design consideration for any green-field substation. The withstand design value at any given sub is based upon the size of conductors chosen for the electric bus and equipment within the yard. The actual fault current value is largely dependent on generation at the transmission levels, and fault current values can increase over the lifetime of the station as additional lines/interconnections are established. Several UI Substations are 40 or more years in age and have not been assessed for fault current design since conception.

Program Need Statement:

The design adequacy of the existing fault current withstand at UI's 115kV Substations were evaluated by NPE Consultants, LLC in 2012. The assessment evaluated the following key areas:

- Short-circuit adequacy of transmission equipment, electric bus, and bus structures
- Protection level from direct stroke lightning
- National Electric Safety Code (NESC) and UI standard conformance regarding phase-to-phase, phase-to-ground clearance requirements and worker approach distances.

NPE provided reports to UI that recommended, on a per station basis, upgrades to the electric bus infrastructure that would ensure fault current withstand and lightning protection levels were at an acceptable level per UI standards. This program will evaluate and implement the recommendations for each station over the next several years and as transmission line outages are available.

There are a total of nine (9) substations that will be completed under this program. UI plans to engineer, procure, and construct Group 1 Substations comprised of Ansonia, June Street, Quinnipiac, and Trap Falls.

Engineering Project Scope:
The results and recommendations of this assessment are to be vetted and executed in this project with engineering by Black & Veatch and procurement and construction completed by UI for Group 1, comprised of Ansonia, June Street, Quinnipiac, and Trap Falls Substations.

Based on UI's current and predicted future maximum short circuit values, Black & Veatch will provide engineering services relative to foundations evaluations and upgrades, steel bus structures evaluations and upgrades, lightning protection assessments and recommendations, and bus calculations with recommended upgrades. Black and Veatch will also convert any Raster or

Vellum drawings to CAD that may not contribute in providing a complete design. Existing fault current information for the substation's 115kV system including complex X/R values were provided by the UI Protection & Control department in support of this assessment. The rigid bus conductor within the substation was evaluated for fault current forces in order to determine its structural adequacy. The substation components and structures were evaluated per the applicable UI design standards and structural design codes/standards.

2016

The United Illuminating Company

Project 801979

[DESIGN ADEQUACY SUMMARY]

Group 1 – Ansonia, June Street, Trap Falls, Quinnipiac

Ansonia (report here)

The NPE results are to be used as a jumping off point for evaluation, the results they give are to be accepted/rejected on a case by case basis.

Task	Responsible
Determine UI's current and predicted future Maximum Short Circuit/Fault Current Values as-well-as X/R ratios.	UI P&C engineer Tony Napikoski to provide guidance.
Review lightning protection assessment provided by B&V to UI	B&V has these reports (SS Component Assessment Project, Project No.: 173441). B&V shall review and assess provide a summary of needs along with recommend solutions with conceptual level cost estimates.
Complete fault current withstand calculations for Existing Buswork and Bus Structures	B&V will provide calculations to UI. If deficiencies are found, B&V will provide recommended solutions to a 50kA rated level as well as conceptual level cost estimates.

June Street (report here)

The NPE results are to be used as a jumping off point for evaluation, the results they give are to be accepted/rejected on a case by case basis.

Task	Responsible
Determine UI's current and predicted future Maximum Short Circuit/Fault Current Values as-well-as X/R ratios.	UI P&C engineer Tony Napikoski to provide guidance.
Review lightning protection assessment provided by B&V to UI	No action required (Lightning protection was addressed during the breaker replacement in 2015)
Complete fault current withstand calculations for Existing Buswork and Bus Structures	B&V will provide calculations to UI. If deficiencies are found, B&V will provide recommended solutions to a 50kA rated level as well as conceptual level cost estimates.
Evaluation of "Type 3" foundations	B&V will investigate the deficiencies of the foundations and provide recommended solutions with conceptual level cost estimates.

Quinnipiac (report here)

The NPE results are to be used as a jumping off point for evaluation, the results they give are to be accepted/rejected on a case by case basis.

Task	Responsible
Determine UI's current and predicted future Maximum Short Circuit/Fault Current Values as-well-as X/R ratios.	UI P&C engineer Tony Napikoski to provide guidance.
Review lightning protection assessment provided by B&V to UI	B&V has these reports (SS Component Assessment Project, Project No.: 173441) B&V shall review and assess provide a summary of needs along with recommend solutions with conceptual level cost estimates.
Complete fault current withstand calculations for Existing Buswork and Bus Structures	B&V will provide calculations to UI. If deficiencies are found, B&V will provide recommended solutions to a 50kA rated level as well as conceptual level cost estimates.
Evaluation of "Type C" foundations	B&V will investigate the deficiencies of the foundations and provide recommended solutions with conceptual level cost estimates.

Trap Falls (report here)

The NPE results are to be used as a jumping off point for evaluation, the results they give are to be accepted/rejected on a case by case basis.

Task	Responsible
Determine UI's current and predicted future Maximum Short Circuit/Fault Current Values as-well-as X/R ratios.	UI P&C engineer Tony Napikoski to provide guidance.
Review lightning protection assessment provided by B&V to UI	B&V has these reports (SS Component Assessment Project, Project No.: 173441) B&V shall review and assess provide a summary of needs along with recommend solutions with conceptual level cost estimates.
Complete fault current withstand calculations for Existing Buswork and Bus Structures	B&V will provide calculations to UI. If deficiencies are found, B&V will provide recommended solutions to a 50kA rated level as well as conceptual level cost estimates.
Engineering weld expert to evaluate A440 welds on Structures 1 and 1A	B&V will investigate the welds and provide recommended solutions with conceptual level cost estimates.

TECHNICAL ASSESSMENT REPORT FOR IMPACT ON CONTROL BUILDING OF TRAP FALLS SUBSTATION FOR FIREWALLS DEMOLITION

B&V PROJECT NO. 191369
B&V FILE NO. 51.1500

PREPARED FOR

The United Illuminating Company

13 January 2017

BLACK & VEATCH
Building a world of difference.

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 PURPOSE OF THE REPORT

The United Illuminating Company (UI) requested Black & Veatch (B&V) to provide engineering services to complete structural and foundation analyses of 2 outer firewalls (East and West) of Trap Falls Substation located at Shelton, CT (See Figure 1). UI is concerned about the structural integrity of the control building after demolition of the Firewalls.

Figure 1:

1.2 BACKGROUND

There are 3 firewalls, one located between the 2- 115kV/13.8kV distribution transformers and one firewall located on the outside of each transformer. The purpose of constructing the outer firewalls was to provide visual screening of the transformers to the public. The trees located around the substation have grown to the point that they not provide visual screening of the transformers. UI therefore decided to remove the outer firewalls to provide space for other structures or equipment, such as lightning shielding masts.

2.0 ANALYSIS DESIGN APPROACH

The architectural and foundation drawings for the firewalls and the control building provide the detailed information needed to perform the analysis. Foundation type and depth, structural and foundation connections of the firewalls with the control buildings were examined as part of the analysis.

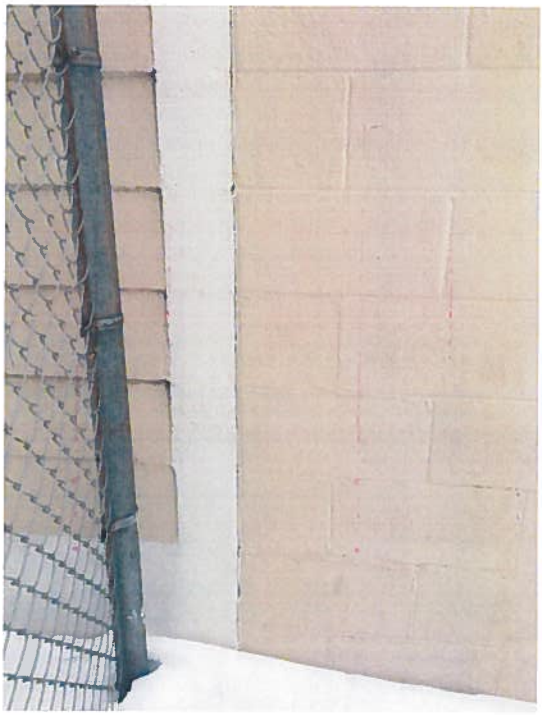
2.1 ANALYSIS ASSUMPTIONS

i) Soil report: No soil report is available for the substation. Spread footings were used for the Trap Falls substation. A 4 ksf allowable bearing capacity has been assumed for the site as this is consistent with the types of rock and soils present at the site.

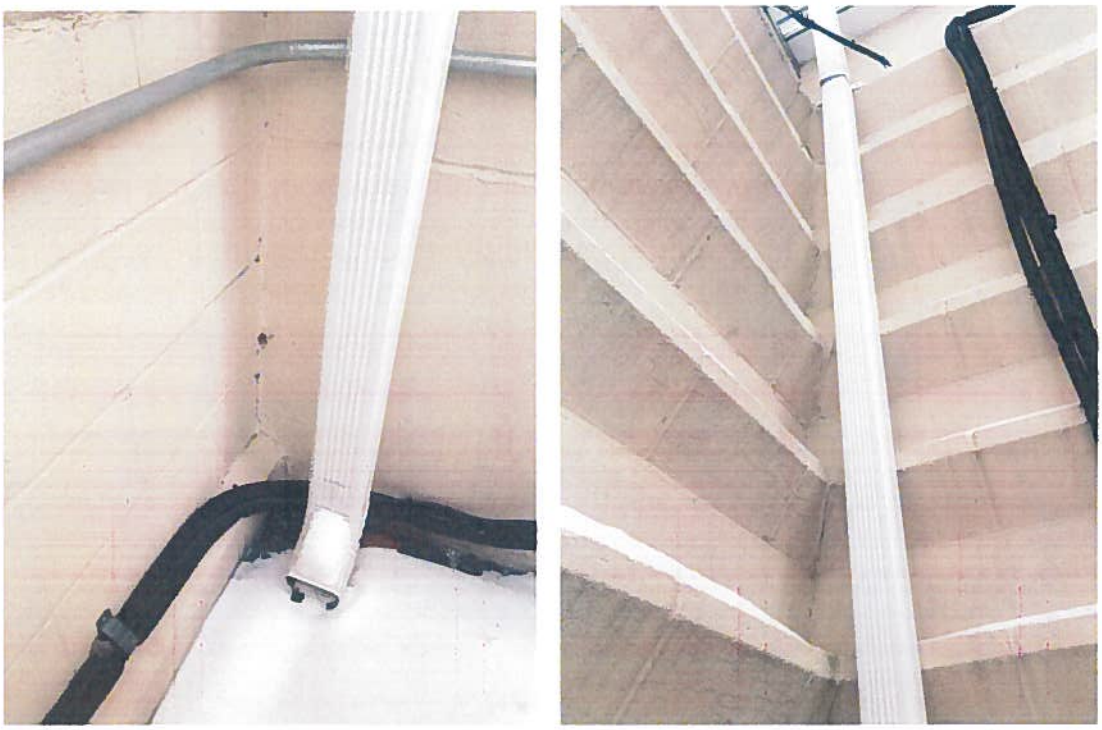
2.2 FIELD INSPECTION OF THE TRANSFORMER WALLS

No field visit was taken specifically for this analysis however, UI had photos of the firewalls and the control building interface so these were used to observe the overall configuration. The site photos are included in this section.

Trap Falls Substation looking South



East Firewall



East Firewall

West Firewall

West Firewall

3.0 DESCRIPTION OF THE FIREWALL

The East and West firewalls are constructed of concrete block support by a 4ft wide strip footing foundation. The cast in place concrete footings are 6'-6" deep and concrete block wall is 12'-8". The firewall spread footing foundations are placed adjacent to the control building foundations but do not support any of the building load.

4.0 ANALYSIS RESULTS SUMMARY

The East and West firewalls are not structurally connected with the building. They are connected architecturally but do not provide any significant lateral support to the building.

5.0 CONCLUSIONS

Demolishing the East and West firewalls will not have any detrimental impact on the structural stability of the control building.

6.0 RECOMMENDATIONS

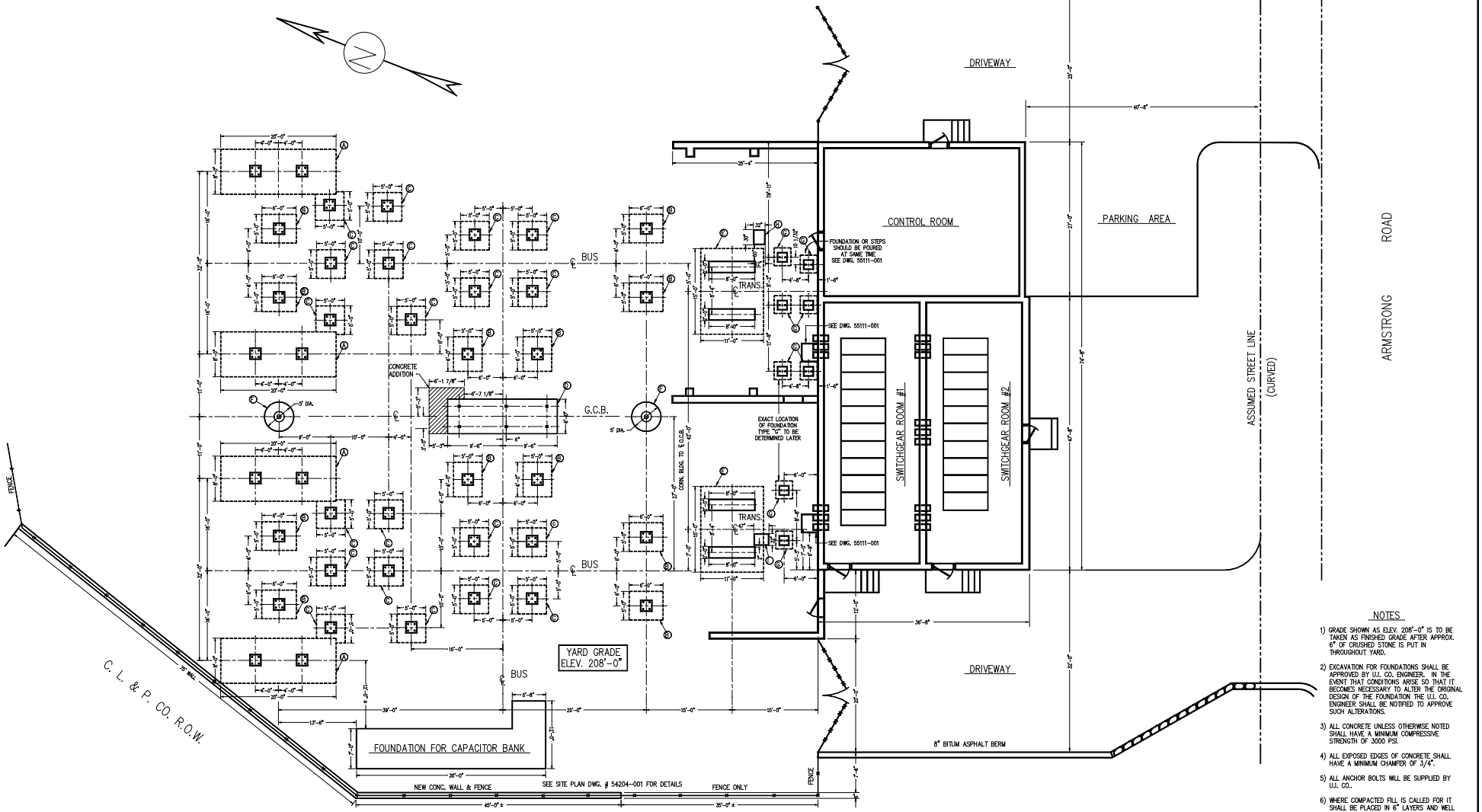
It is recommended that demolition to be accomplished by detaching the firewalls from the control building and then disassembling the firewalls. The concrete foundations can be completely removed or just demolished to a depth of two feed below grade. Placing compacted backfill in the

area adjacent to the control building is required using well graded granular material after removing the firewalls.

Attachment A

YARD FOUNDATION PLAN,

DRAWING NO. 54204-004



NOTES

1) GRADE SHOWN AS ELEV. 208'-0" IS TO BE TAKEN AS FINISHED GRADE AFTER APPROX. 6" OF CRUSHED STONE IS PUT IN THROUGHOUT YARD.
2) EXCAVATION FOR FOUNDATIONS SHALL BE APPROVED BY U.I. CO. ENGINEER. IN THE EVENT THAT CONDITIONS ARISE SO THAT IT BECOMES NECESSARY TO ALTER THE ORIGINAL DESIGN OF THE FOUNDATION THE U.I. CO. ENGINEER SHALL BE NOTIFIED TO APPROVE SUCH ALTERATIONS.
3) ALL CONCRETE UNLESS OTHERWISE NOTED SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.
4) ALL EXPOSED EDGES OF CONCRETE SHALL HAVE A MINIMUM CHAMFER OF 3/4".
5) ALL ANCHOR BOLTS WILL BE SUPPLIED BY U.I. CO..
6) WHERE COMPACTED FILL IS CALLED FOR IT SHALL BE PLACED IN 6" LAYERS AND WELL COMPACTED BY HAND OPERATED PNEUMATIC OR GASOLINE DRIVEN TAMPER.
7) FOR DETAILS OF CAPACITOR BANK FOUNDATIONS SEE U.I. DWG. # 55211-088

DOES NOT CONTAIN CRITICAL ENERGY INFRASTRUCTURE INFORMATION
DATE OF REVIEW 11/05/10 BY JLR

THIS DWG. HAS BEEN REDRAWN FROM, AND REPLACES OLD U.I. DWG. # 54204-4 SHEET 1; DATE 03/31/69; REVISION # 3.

REFERENCE DRAWINGS
FOUNDATION DETAILS 54204-005

No	Date	Revision	By	Chkd.	Engr.	Supv.
2	11/19/2012	CONFORMED TO CONSTRUCTION RECORDS - PROJECT 176046	BJF	JBS	GRV	AUL
1	12/04/94	NITROGEN SYSTEM FOUNDATION ADDITION	MEC	W.J.	J.M.	

United Illuminating
an investor-owned electric light and power company

Drawn MEC Date 11/30/94 Scale: 1/8"=1'-0"
Chkd. W.J. Design Engr. J.Z. Design Supv.

FOUNDATIONS PLAN
TRAP FALLS SUBSTATION

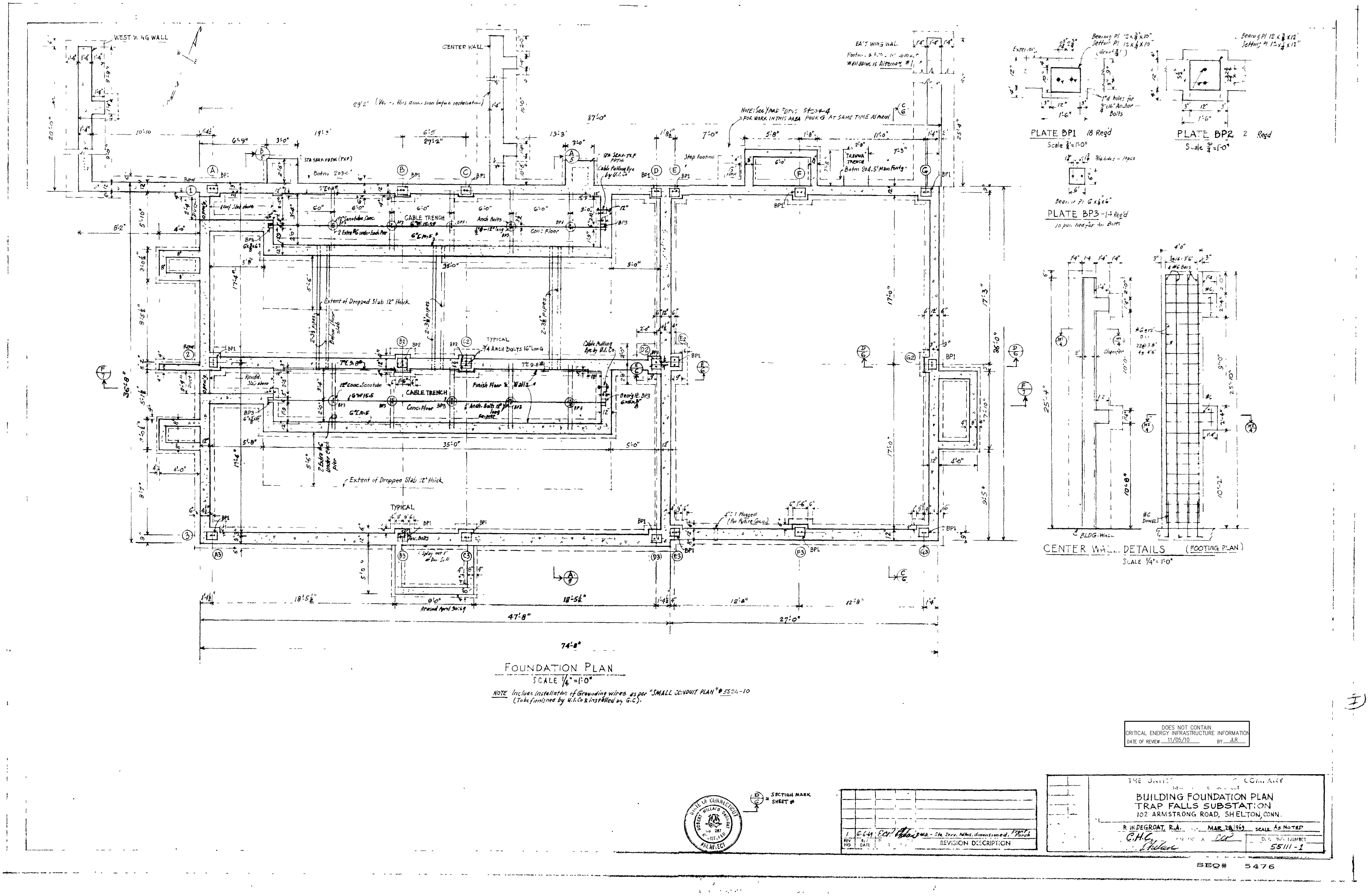
CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
005313	005313	54204-004

Attachment B

BUILDING FOUNDATION PLAN,

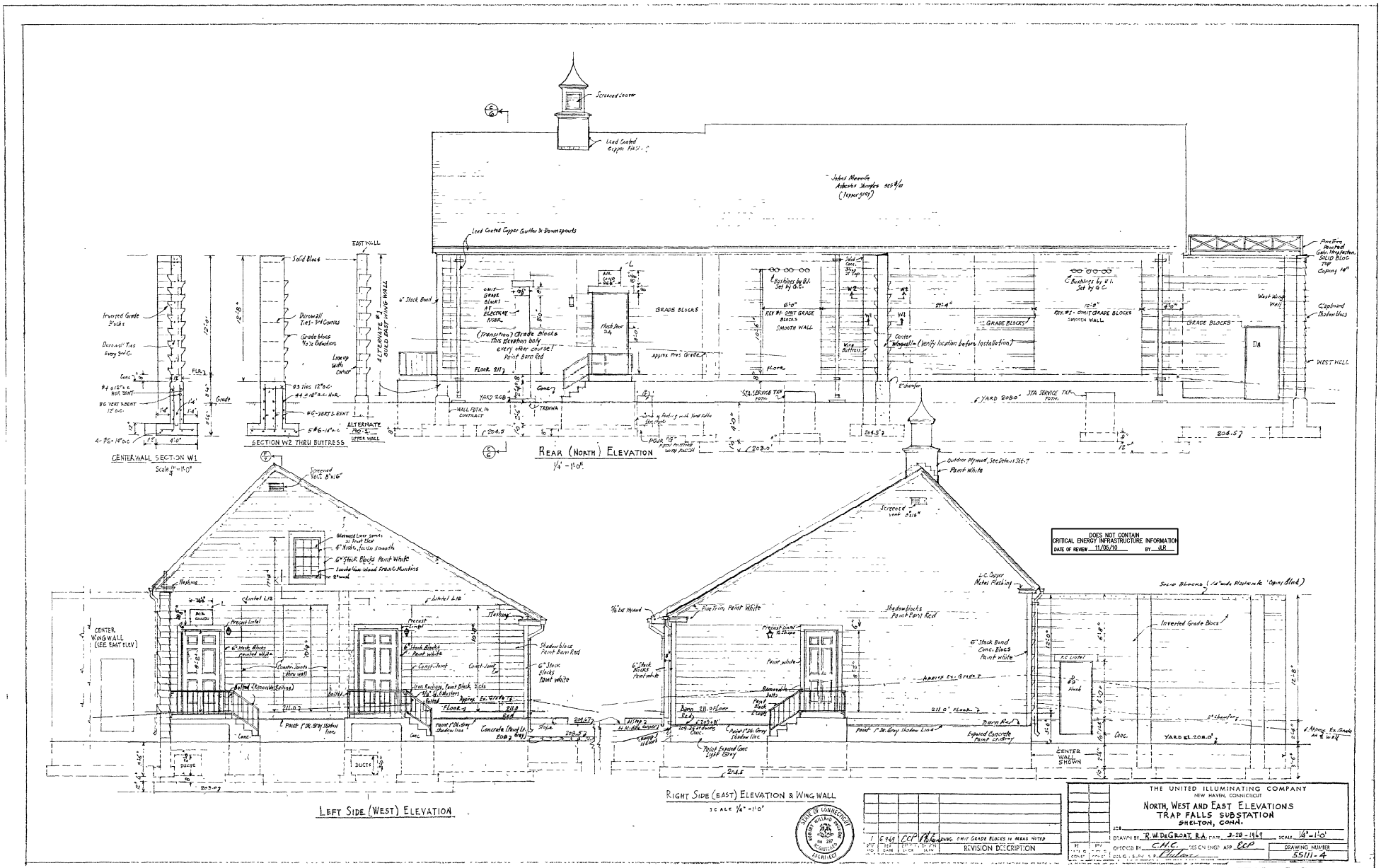
DRAWING NO. 55111-1

Attachment 2



Attachment C

NORTH, WEST AND EAST ELEVATIONS, DRAWING NO. 55111-4



THE UNITED ILLUMINATING COMPANY
NEW HAVEN, CONNECTICUT

NORTH, WEST AND EAST ELEVATIONS
TRAP FALLS SUBSTATION
SHELTON, CONN.

DRAWN BY	R.W. DeGROAT, B.A.	DATE	3-28-1969
CHECKED BY	C.H.C.	SCALE	1/4"=1'-0"
		DRAWING NUMBER	55111-A

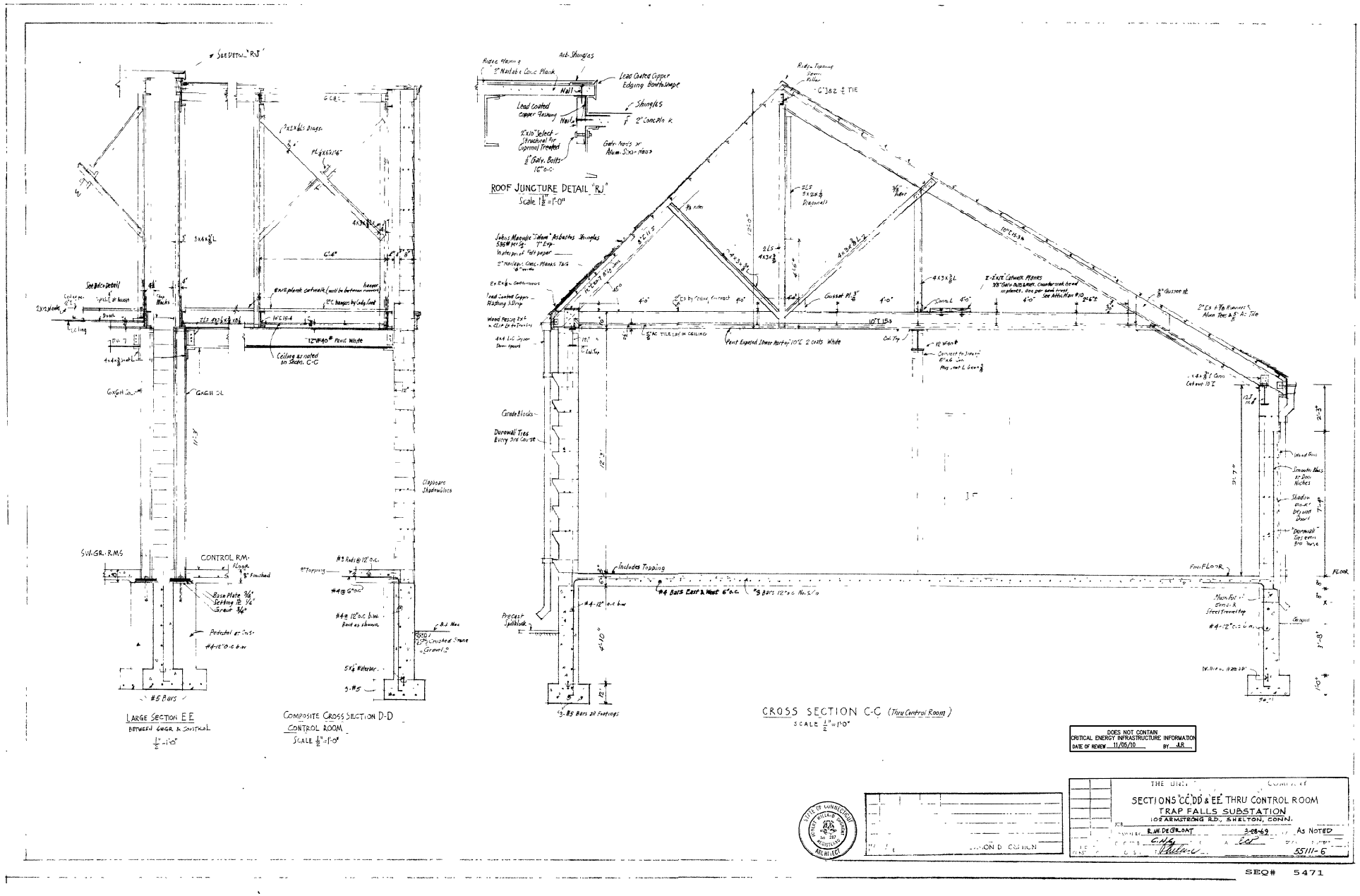
NO.	DATE	BY	REVISION DESCRIPTION
1	6-9-69	CCP	DWG. OMIT GRADE BLOCKS IN AREAS NOTED

SEQ# 5473

Attachment D

SECTION C-C&D-D DETAILS,

DRAWING NO. 55111-6


ROOF JUNCTURE DETAIL "RJ"
Scale 1½"=1'-0"
CROSS SECTION C-C (Thru Control Room)
SCALE ½"=1'-0"
LARGE SECTION E E
BETWEEN GNGR & SWITCH
½"=1'-0"
COMPOSITE CROSS SECTION D-D
CONTROL ROOM
SCALE ½"=1'-0"
CONTROL RM. Floor
SW. GR. RMS
Ceiling as noted on Sheet C-C
Grade Blocks
Durowall Ties
Precast Splitblock
#4 Bars East & West 6" o.c.
#5 Bars 12" o.c. No. S/O
Includes Topping
Finish Floor
Clapboard Shadowblocks
DOES NOT CONTAIN
CRITICAL ENERGY INFRASTRUCTURE INFORMATION
DATE OF REVIEW 11/05/10 BY JR
SECTIONS CC, DD & EE THRU CONTROL ROOM
TRAP FALLS SUBSTATION
102 ARMSTRONG RD., SHELTON, CONN.
R.W. DEGROAT
3-28-69
As Noted
55111-6
SEQ# 5471

Attachment 3

ALL-POINTS TECHNOLOGY CORPORATION

VISIBILITY ANALYSIS

TRAP FALLS SUBSTATION
70 FOOT LIGHTNING MAST STRUCTURE
SHELTON, CONNECTICUT

Prepared for:

The United Illuminating Company
180 Marsh Hill Road
Orange, CT 06108

Prepared by:

All-Points Technology Corporation, P.C.
3 Saddlebrook Drive
Killingworth, CT 06419

MAY 2017

Project Introduction

The United Illuminating Company ("UIC") proposes to modify its existing Trap Falls Substation located north of Armstrong Road in Shelton, Connecticut (the "Site"). The proposed modifications include the addition of lightning masts and the removal of firewalls. At the request of UIC, All-Points Technology Corporation, P.C. ("APT") prepared this Visibility Analysis to evaluate potential views associated with the proposed modifications from locations within one (1) mile of the Site (the "Study Area"). In addition to Shelton, the southern half of the Study Area extends into the neighboring municipality of Stratford.

Site Description and Setting

The Site is currently developed with the Trap Falls Substation. The proposed Substation modifications will occur in the southern portion of the existing Substation, near the Site's entrance from Armstrong Road. The new Substation components will consist of two (2) new, 70-foot tall lightning masts and the removal of two (2) fire walls.

The Site is located in the southern section of Shelton characterized by residential development and wooded land. Similar land uses are located in Stratford to the south. An overhead electrical transmission line corridor extends north to south through the center of the Study Area; the lines interconnect with the existing Substation. The Route 8 transportation corridor lies to the north.

The topography within the Study Area is characterized generally by rolling topography with steep hills to the northwest; ground elevations range from approximately a few feet below sea level to 630 feet AMSL. The tree cover within the Study Area (consisting of mixed deciduous hardwoods with interspersed stands of conifers) occupies approximately 1,121 acres of the 2,010-acre study area (±56%).

Methodology

APT used the combination of a predictive computer model and in-field analysis to evaluate the visibility associated with the addition of the two (2) lightning masts on both a quantitative and qualitative basis. The predictive model provides a measurable assessment of potential visibility throughout the entire Study Area including private properties and other areas inaccessible for direct observations. The in-field analyses included a reconnaissance of publicly-accessible locations within the Study Area to record existing conditions, verify results of the model, inventory visible and nonvisible locations associated with the existing substation, and provide photographic documentation. A description of the procedures used in the analysis is provided below.

Computer Modeling

To conduct this assessment, a predictive computer model was developed specifically for this project using TerrSet, an image analysis program developed by Clark Labs at Clark University, to provide an estimation of potential visibility throughout the Study Area. The predictive model incorporates Project- and Study Area-specific data, including the site location, its ground elevation and the proposed component heights, as well as the surrounding topography, existing vegetation, and structures (which are the primary features that can block direct lines of sight).

Information used in the model included lidar[1]-based digital elevation data and customized land use data layers developed specifically for this analysis. Lidar is a remote-sensing technology that develops elevation data in meters by measuring the time it takes for laser light to return from the surface to the instrument's sensors. The varying reflectivity of objects also means that the returns can be classified based on the characteristics of the reflected light, normally into categories such as "bare earth," "vegetation," "road," or "building." The system is also designed to capture many more data points than older radar-based systems. Thus, lidar-based digital elevation models ("DEM"s) have a much finer resolution and can also identify the different features of the landscape at the time that it was captured.

Viewshed analysis using lidar data provide a much more detailed view of the potential obstacles (especially trees and buildings), and therefore the viewshed modeling produces results with many smaller areas of visibility than those produced by using radar-based DEMs. Its precision makes lidar a superior source of data, but at present it is only available for limited areas of the state. The viewshed results are also checked against the most current aerial photographs in case significant changes (a new housing development, for example) have occurred since the time the lidar data was captured.

The lidar-based DEM created for this analysis represents topographic information for the state of Connecticut that was derived through the spatial interpolation of airborne LiDAR-based data collected in the years 2011 through 2014 and has a horizontal resolution of approximately two (2) feet. In addition, multiple land use data layers were created from the Natural Resources Conservation Service (through the USDA) aerial photography (1-meter resolution, flown in 2014) using the image processing tools. Terrset develops light reflective classes defined by statistical analysis of individual pixels, which are then grouped based on common reflective values such that distinctions can be made automatically between deciduous and coniferous tree species, as well as grassland, impervious surface areas, surface water and other distinct land use features.

With these data inputs, the model was then queried to: determine where at least the top of the proposed lightning masts might be seen from any point(s) within the Study Area; and, similarly,

[1] Lidar (a word invented to mean "light radar") may also be referred to as LiDAR, an acronym for Light Detection and Ranging. It is a technology that utilized lasers to determine the distance to an object or surface. LiDAR is similar to radar, but incorporates laser pulses rather than sound waves. It measures the time delay between transmission and reflection of the laser pulse.

where portions of the lower ground equipment might be visible. The results of the analysis are intended to provide a representation of those areas where portions of the masts **may** potentially be visible to the human eye without the aid of magnification, based on a viewer eye-height of five (5) feet above the ground and the combination of intervening topography, trees and other vegetation, and structures. The masts however may not necessarily be visible from all locations within those areas identified by the predictive model. It is important to note that the computer model cannot account for mass density, the height, diameter and branching variability of the trees, or the degradation of views that occur with distance. In addition, each point – or pixel - represents about one square meter in area, and thus is not predicting visibility from all viewpoints through all possible obstacles. Although large portions of the predicted viewshed may theoretically offer visibility of the masts, because of these unavoidable limitations the quality of those views may not be sufficient for the human eye to recognize specific features or discriminate them from other surrounding objects. Visibility also varies seasonally with increased, albeit obstructed, views occurring during "leaf-off" conditions. Beyond the density of woodlands found within the given Study Area, each individual tree has its own unique trunk, pole timber and branching pattern characteristics that provide varying degrees of screening in leafless conditions which cannot be precisely modeled.

Once the data layers were entered, image processing tools were applied and overlaid onto USGS topographic base maps and aerial photographs to achieve an estimate of locations where the proposed masts might be visible.

In-Field Activities

To supplement and substantiate the results of the computer modeling efforts, APT completed in-field verification activities consisting of vehicular and pedestrian reconnaissance and photo-documentation. Information obtained from the field reconnaissance was subsequently incorporated into the computer model to refine the visibility map.

Field Reconnaissance

APT visited the Site and conducted field reconnaissance on January 27, 2015. These events included both a pedestrian reconnaissance of the immediate Site vicinity and a drive-by inspection of the local and State roads within the Study Area. Those locations where infrastructure associated with the existing substation could be seen were inventoried. Visual observations from the reconnaissance were also used to evaluate the results of the preliminary visibility mapping and assess any potential discrepancies in the initial modeling.

Photographic Documentation

During the field reconnaissance, APT photo-documented conditions from areas surrounding the existing substation and Project area. Photographs were obtained from several vantage points to document the view towards the Site. At each photo location, the geographic coordinates of the camera's position were logged using global positioning system ("GPS") equipment technology.

Photographic renderings of the proposed Substation modifications were generated to portray scaled representations of the proposed lightning masts.

Photographs were taken with a Canon EOS 6D digital camera body and Canon EF 24 to 105 millimeter ("mm") zoom lens, with the lens set to 50 mm for a consistent field of view.

Photographs and Renderings

Photographic renderings were generated to portray scaled representations of the proposed Substation modifications that would be visible from nearby locations. Photographs and renderings are provided in the attachment to this report. Using field data, site plan information and 3-dimension (3D) modeling software, spatially referenced models of the site area and modified Substation were generated and merged. The geographic coordinates obtained in the field for the photograph locations were incorporated into the model to produce virtual camera positions within the spatial 3D model. Photo renderings were then created using a combination of images generated in the 3D model and photo-rendering software programs.

For presentation purposes in this report, the photographs are produced in an approximate 7" by 10.5" format. When viewing in this format size, we believe it is important to provide the largest representational image while maintaining an accurate relation of sizes between objects within the frame of the photograph.

Visibility Analysis Results

The results of our analysis are graphically displayed on the View Shed Maps provided in the attachment to this report.

In general, year-round views of the new Substation structures would be limited to a modest geographic footprint surrounding the Site, where existing views of the facility occur today. The proposed lightning masts (at heights of 70 feet tall) are shorter than several surrounding transmission line support structures which rise to heights of 100+ feet above grade. Portions of the proposed lightning masts may be visible year-round from some locations within a total area of approximately eight (8) acres. The majority of these views northward would be on the Site and extend into vacant, undeveloped areas including the transmission corridor for a distance of approximately 500 feet. Southward, views would extend a similar distance beyond Armstrong Road, primarily over undeveloped marsh. Four (4) residences are located south/southwest of the Site and Armstrong Road, one directly across the street from the Substation, and will have views of at least portions of the new lightening masts. These residences currently have views of the Substation and transmission infrastructure. Year-round views of the new lightning masts will not extend substantially to the east or west.

Seasonally, when the leaves are off the trees, views may extend to some locations over an additional area of ±43 acres to the south and to a lesser degree north and west of the Site. From the majority of these locations, the proposed new structures would not be dissimilar to, or readily discernable from, what can be seen today.

The results of this analysis demonstrate that the proposed modifications to the Trap Falls Substation will not have a substantial adverse visual effect on the surrounding environment.

Proximity to Schools And Commercial Child Day Care Centers

No schools or commercial child day care centers are located within 250 feet of the Site. The nearest school (Long Hill School) is located approximately 1.9 miles to the northeast at 565 Long Hill Avenue in Shelton, well beyond the limits of visibility associated with the Substation and its infrastructure. The nearest commercial child day care center (Tutor Time Child Care Learning Center; 708 Bridgeport Avenue) is located approximately 0.9 mile to the north/northwest. Similarly, this location would have no views of the Substation or the proposed lightning masts.

Limitations

The viewshed map presented in the attachment to this report depict areas where the proposed additions may potentially be visible to the human eye without the aid of magnification based on a viewer eye-height of 5 feet above the ground and intervening topography. This analysis may not necessarily account for all visible locations, as it is based on the combination of computer modeling, incorporating 2014 aerial photographs, and in-field observations from publicly-accessible locations. No access to private properties was provided to APT personnel. This analysis does not claim to depict the only areas, or all locations, where visibility may occur; it is intended to provide a representation of those areas where the masts are likely to be seen.

The simulations provide a representation of the modified Substation under similar settings as those encountered during the time of the reconnaissance. Views can change throughout the seasons and the time of day, and are dependent on weather and other atmospheric conditions (e.g., haze, fog, clouds); the location, angle and intensity of the sun; and the specific viewer location. Weather conditions on May 20, 2015 included partly cloudy skies and the photo-simulations presented in this report provide an accurate portrayal of the proposed modifications during comparable conditions.

ATTACHMENTS

PHOTO LOG

Legend

Proposed Lightning Mast | Year-Round Visibility | Seasonal Visibility | Not Visible

1 inch = 400 feet

400 200 0 400 F

ALL-POINTS TECHNOLOGY CORPORATION

The United Illuminating Company

DOCUMENTATION

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
1	**ARMSTRONG ROAD**	**NORTHWEST**	**+/- 128 FEET**	**YEAR ROUND**

SIMULATION

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
1	**ARMSTRONG ROAD**	**NORTHWEST**	**+/- 128 FEET**	**YEAR ROUND**

DOCUMENTATION

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
2	**ARMSTRONG ROAD**	**NORTH**	**+/- 166 FEET**	**NOT VISIBLE**

SIMULATION

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
2	**ARMSTRONG ROAD**	**NORTH**	**+/- 166 FEET**	**NOT VISIBLE**

DOCUMENTATION

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
3	**JAMES FARM ROAD AT ARMSTRONG ROAD**	**NORTHEAST**	**+/- 482 FEET**	**SEASONAL**

DOCUMENTATION

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
4	**LEO LANE**	**NORTH**	**+/- 0.21 MILE**	**NOT VISIBLE**

DOCUMENTATION

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
5	**JAMES FARM ROAD**	**NORTHEAST**	**+/- 0.26 MILE**	**NOT VISIBLE**

DOCUMENTATION

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
6	**SCONSET CIRCLE**	**EAST**	**+/- 0.13 MILE**	**NOT VISIBLE**

DOCUMENTATION

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
7	BARTLET LANE	SOUTHEAST	+/- 0.12 MILE	NOT VISIBLE

DOCUMENTATION

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
8	**DAYBREAK LANE**	**SOUTHEAST**	**+/- 0.12 MILE**	**SEASONAL**

DOCUMENTATION

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
9	**PARTRIDGE LANE**	**SOUTHWEST**	**+/- 0.14 MILE**	**NOT VISIBLE**

DOCUMENTATION

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
10	**OLD STRATFORD ROAD AT ARMSTRONG ROAD**	**SOUTHWEST**	**+/- 0.22 MILE**	**NOT VISIBLE**

DOCUMENTATION

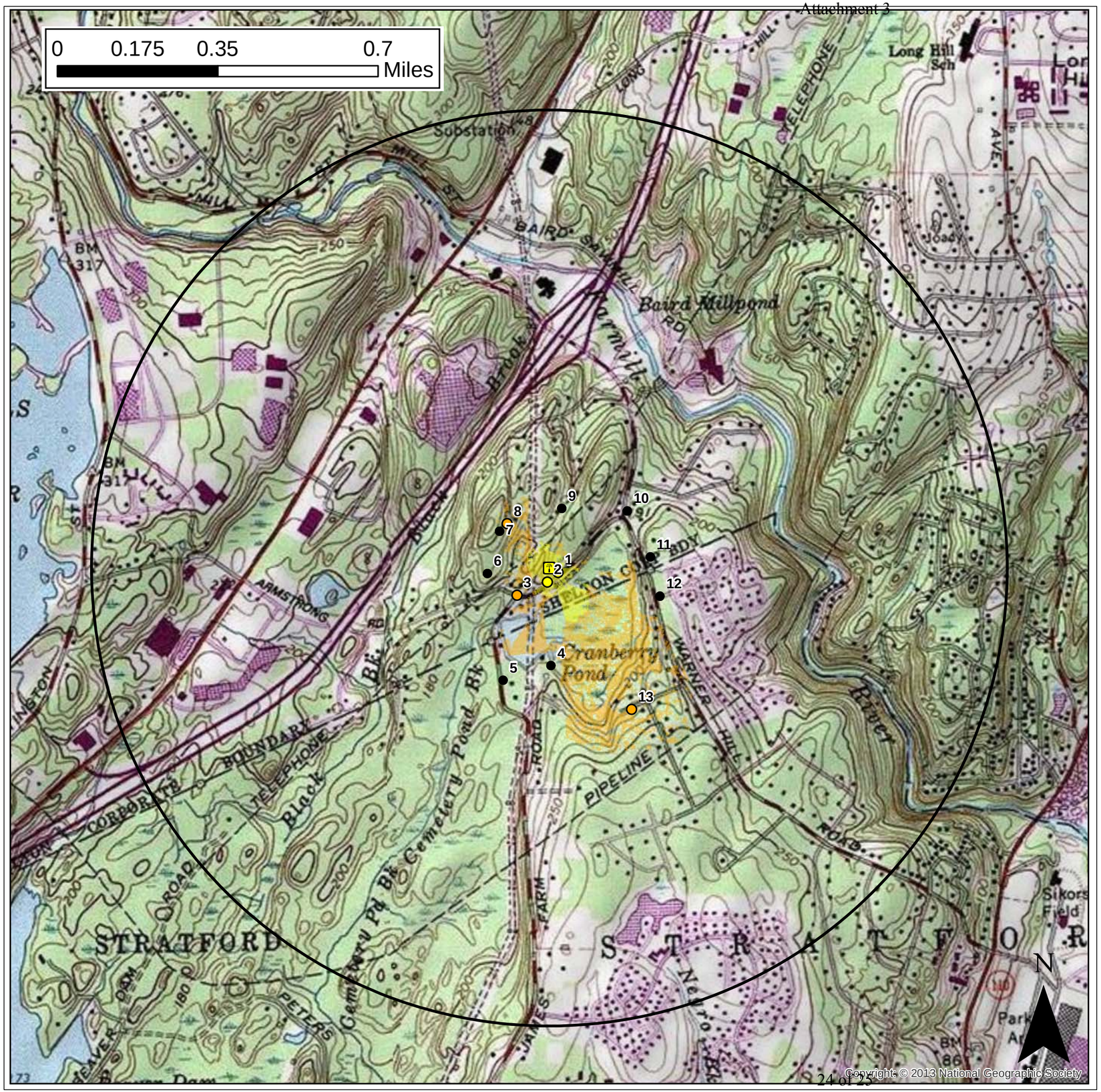
PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
11	**STERLING RIDGE**	**WEST**	**+/- 0.23 MILE**	**NOT VISIBLE**

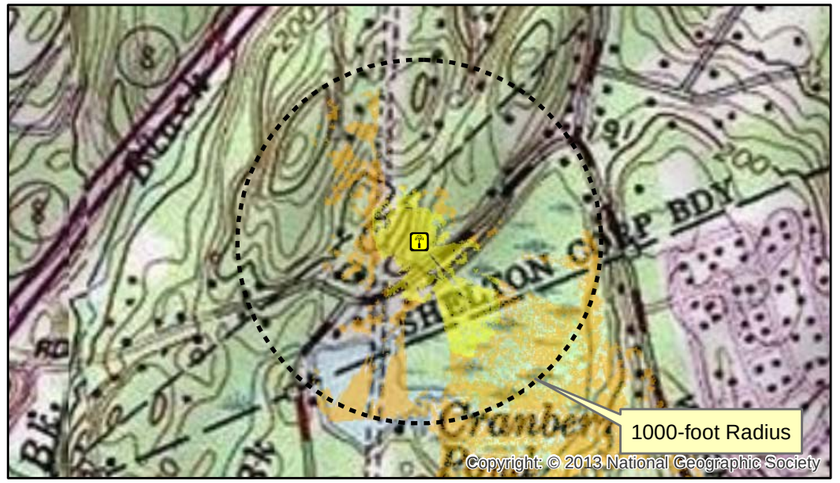
DOCUMENTATION

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
12	**RIVER BEND ROAD AT WARNER HILL ROAD**	**NORTHWEST**	**+/- 0.26 MILE**	**NOT VISIBLE**

DOCUMENTATION

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
13	**COE AVENUE**	**NORTHWEST**	**+/- 0.36 MILE**	**SEASONAL**





Viewshed Map – Topo Base

Proposed Lightning Masts
Trap Falls Substation
161 Armstrong Road, Shelton, CT

Proposed lightning masts are 70 feet AGL.
Existing tree canopy height estimated with lidar data.
Study area encompasses a one-mile radius and includes 2,010 acres of land.

Map compiled 2/2/2017

Map information field verified by APT on 1/27/2017.

Legend

- Proposed Tower

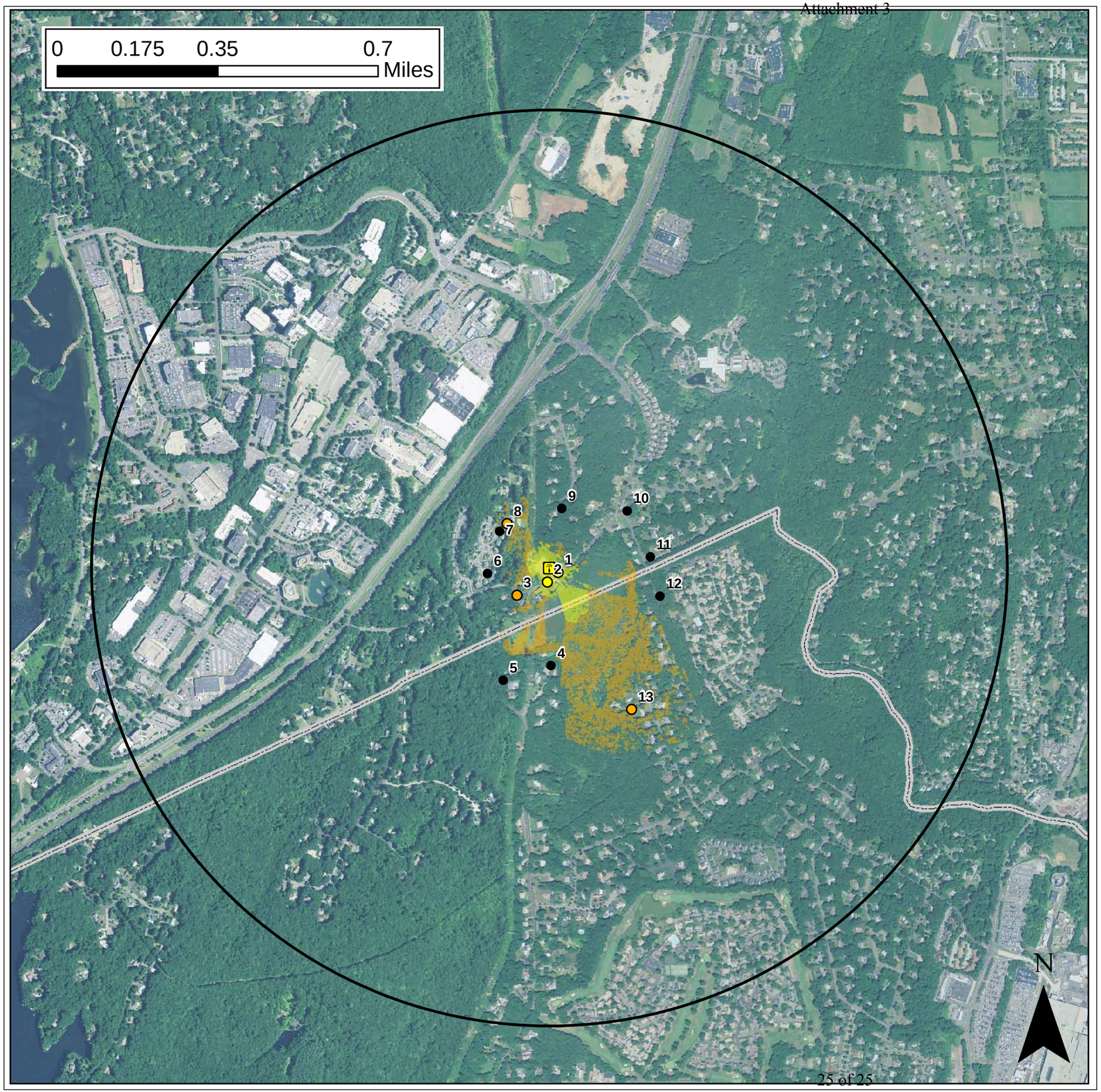
Photo Locations

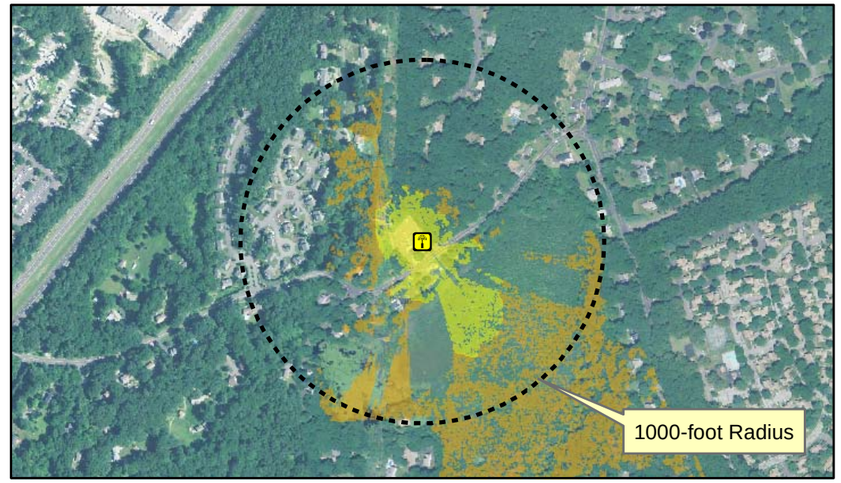
- Not Visible
- Seasonal Views
- Year-round Views
- Predicted Seasonal Visibility (43 Acres)
- Predicted Year-Round Visibility (8 Acres)
- Towns
- 1-Mile Study Area

Location

The United Illuminating Company

ALL-POINTS TECHNOLOGY CORPORATION





Viewshed Map – Aerial Base

Proposed Lightning Masts
Trap Falls Substation
161 Armstrong Road, Shelton, CT

Proposed lightning masts are 70 feet AGL.
Existing tree canopy height estimated with lidar data.
Study area encompasses a one-mile radius and
includes 2.010 acres of land.

Map compiled 2/2/2017

Map information field verified by APT on 1/27/2017.

Legend

- Proposed Tower

Photo Locations

- Not Visible
- Seasonal Views
- Year-round Views
- Predicted Seasonal Visibility (43 Acres)
- Predicted Year-Round Visibility (8 Acres)
- Towns
- 1-Mile Study Area

Location

The United Illuminating Company

ALL-POINTS TECHNOLOGY CORPORATION

TRAPP FALLS SUBSTATION DESIGN ADEQUACY PROJECT SOUND LEVEL REPORT

Shelton, CT

B&V PROJECT NO. 191369

PREPARED FOR

United Illuminating

4 MAY 2017

BLACK & VEATCH
Building a world of difference.®

Table of Contents

LIST OF TABLES

LIST OF FIGURES

1.0 Introduction

United Illuminating (UI) is evaluating the removal of two transformer firewalls at the existing UI Trapp Falls Substation (Substation) located in the City of Shelton, in Fairfield County, Connecticut. To assist with the siting board approval process, Black & Veatch has conducted a predictive assessment to quantify the acoustic impacts to the community surrounding the Substation in the event the transformer firewalls are removed. This report summarizes the calculated sound levels associated with the following:

- Substation as currently installed
- Future sound levels once the proposed firewalls have been removed (Future Substation)
- Potential acoustical impacts imposed by the removal of these firewalls.

2.0 Applicable Sound level Regulations

The Substation is located within the City of Shelton in Fairfield County Connecticut and therefore is subject to meeting the acoustical requirements specified by the City of Shelton and the State of Connecticut.

The local ordinance for the City of Shelton is specified in Chapter 7, Article III, and Section 7-44 of the City of Shelton Code of Ordinances. The project site is currently zoned as PRD-23[1] (planned residential District). The land is being used for utility purposes and falls under the Class C noise zone designation. Project noise emissions are subjected to regulations for noise sources emitting from a Class C noise zone to a Class A noise zone. The limits are an A-weighted sound pressure level of 61 dBA daytime and 51dBA nighttime measured at the nearest adjacent residential Class C to class A property boundaries. Daytime hours are defined as the hours between 7:00 AM and 10:00 PM and nighttime hours are defined as the hours between 10:00 PM and 7:00 AM.

The state regulation governing noise is contained in the Regulations of Connecticut State Agencies (RCSA). The RSCA sound level limits are specified in Section 22a-69-1.9 which state that the limits for a noise source within a Class C noise zone (which covers utilities) when adjacent to a Class A noise zone (residential) are 61 dBA during daytime hours and 51 dBA during nighttime hours. Daytime hours are defined as the hours between 7:00 AM and 10:00 PM and nighttime hours are defined as the hours between 10:00 PM and 7:00 AM.

[1] http://cityofshelton.org/wp-content/uploads/2010/10/pdf_pz_Zoning_Map-11-29-11%20%5B34x44%5D.pdf

3.0 Substation Noise Emissions

3.1 NOISE MODELING

Substation environmental sound levels were calculated via acoustical analysis in accordance with ISO 9613[2] methodologies. Project sound sources were considered with respect to environmental characteristics that influence the propagation of outdoor sound (such as terrain type, topography, and interceding barriers).

Characteristics of the environment affecting the propagation of sound include terrain type, topography, interceding barriers, and atmospheric effects. Ground in the acoustical model is conservatively assumed to be acoustically dense, with wooded areas bordering and surrounding the substation. Buildings within the Project site are assumed to have overall heights of 18-20 feet (i.e., single-story). Default ISO 9613 atmospheric assumptions are conservative; downwind conditions and the presence of a mild temperature inversion, such as may occur on a clear night, between each sound source and grid receiver point.

3.2 SUBSTATION SOUND SOURCES

The Project site has two transformers currently in service, a control building and two switchgear rooms, along with ancillary electrical support structures. The existing Project equipment and structure layout was based on UI layout drawing 54204-004, dated 19 November 2012. The proposed firewall removal was based on UI Layout drawing 54204-002DEMO Revision, dated 11 November 2016.

Transformer near-field sound pressure levels provided by the manufacturer are shown in Table 3-1. These levels represent the maximum near-field values used in this analysis.

Table 3-1 Substation Equipment Sound Levels

TRANSFORMER ID	MVA RATING	COOLING STAGE	MANUFACTURER PROVIDED SOUND LEVELS, dBA
TR A	24/32/40 MVA	OA/FA/FA	66
TR B	24/32/40 MVA	OA/FA/FA	66

3.3 EXISTING SUBSTATION (ONLY) SOUND LEVELS

The resulting noise emissions associated with the existing Substation are presented in Figure 3-1 as sound level contours. The noise contours represent the overall A-weighted sound pressure levels at 5 dB intervals. It is important to note that the predicted Substation noise emissions only include noise resulting from the proposed Substation and are exclusive of any background noise.

[2] ISO 9613 *Acoustics—Attenuation of sound during propagation outdoors*, Parts 1 and 2, International Organization of Standardization, 1993 and 1996, respectively.

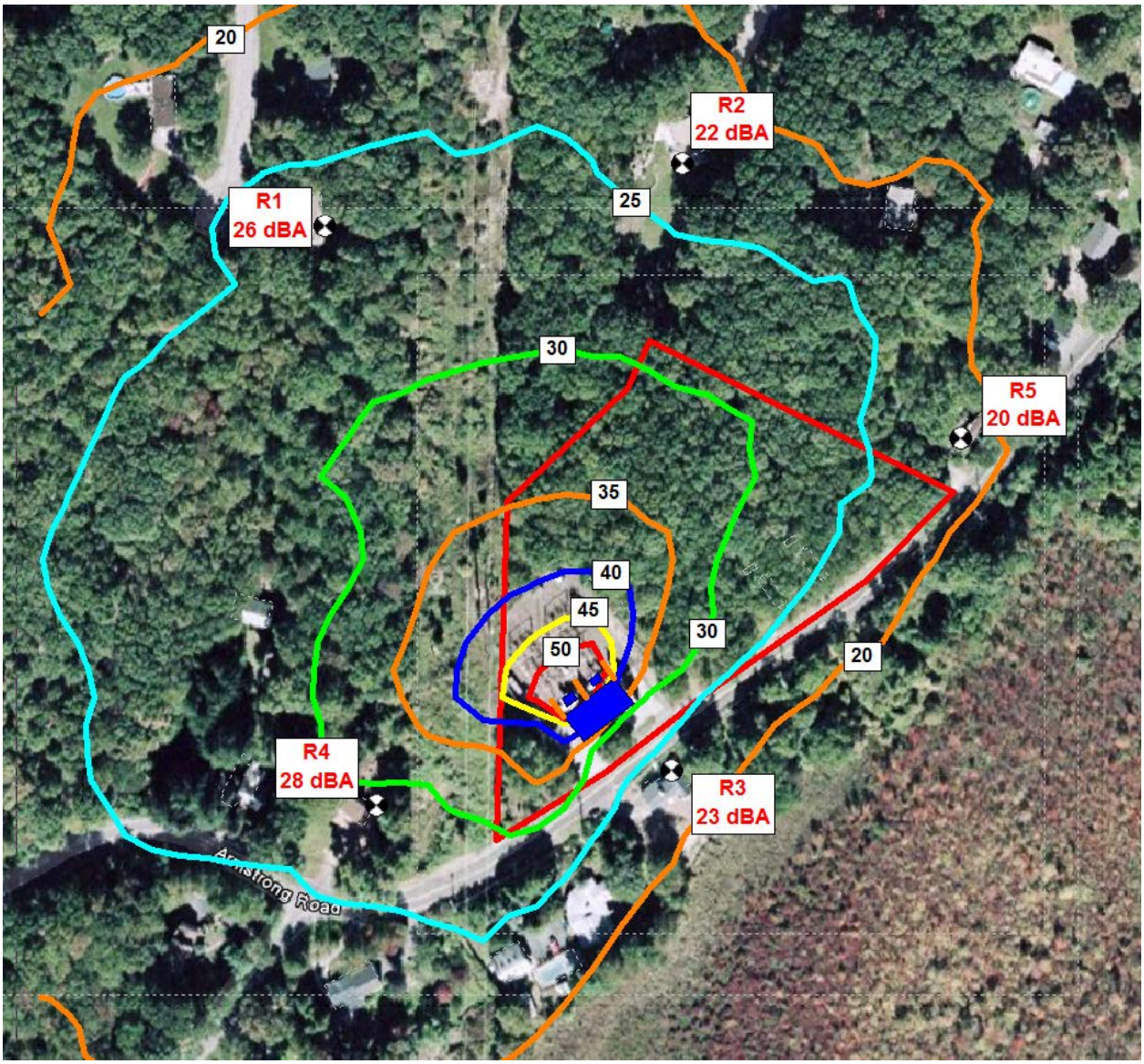


Figure 3-1 Calculated Sound Level Contours for the Existing Substation (Only)

3.4 FUTURE SUBSTATION (ONLY) SOUND LEVELS

The predicted noise emissions from the substation have been calculated in order to determine compliance with the state and local noise regulations and the potential future noise impacts on the neighboring sensitive receptors.

The proposed removal of the firewalls at the project site will increase the environmental noise emissions from the project site by 1dB to 4dB. These sound level changes are considered "slightly noticeable", and however only slightly increase the lowest L_{90} sound levels conducted during the quietest survey period sound levels reported in the "Environmental Noise Impact Assessment" dated 2009. The proposed firewall removal project is expected to be in compliance with the state and local noise regulations.

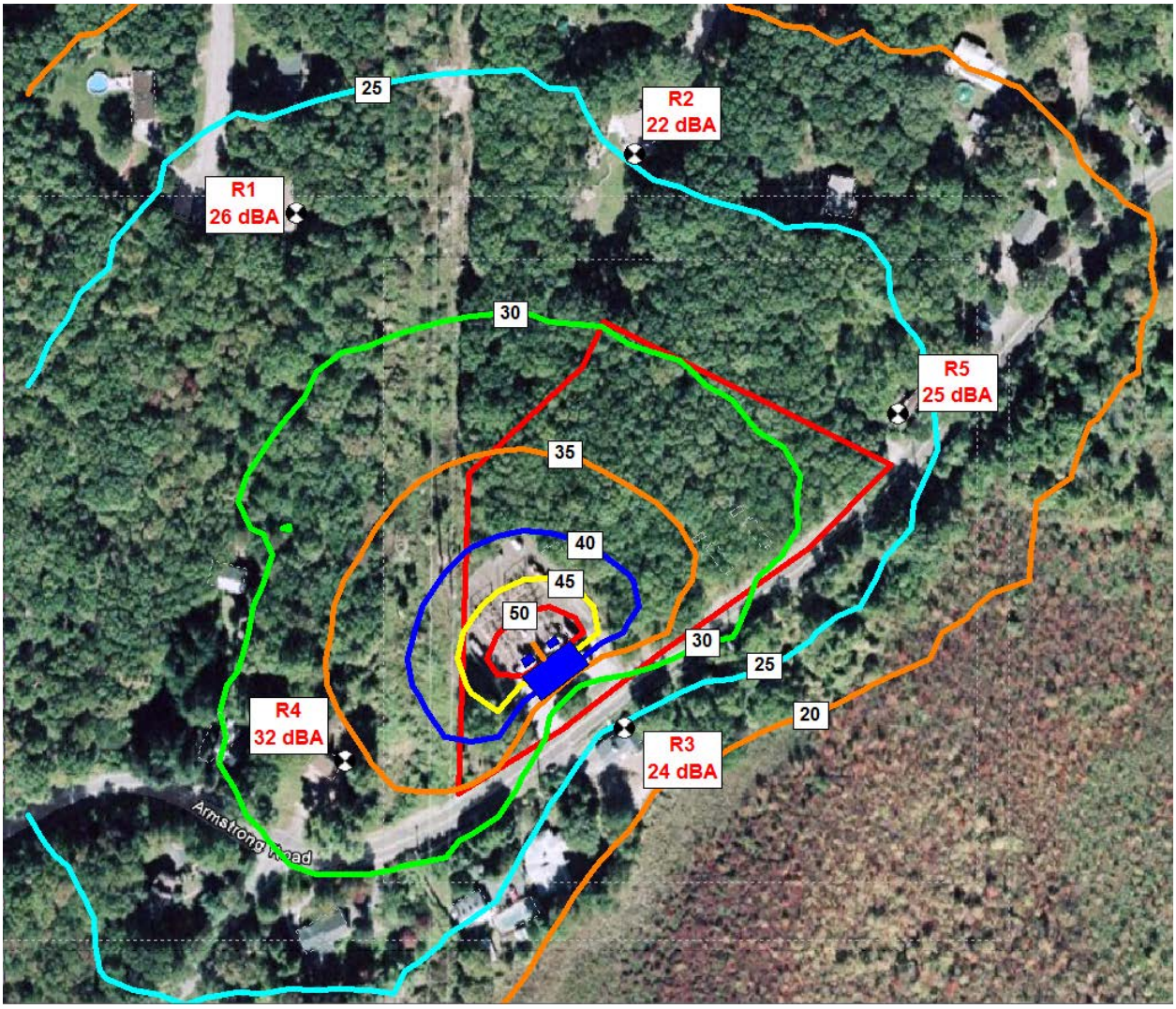


Figure 3-2 Calculated Project Site Sound Level Contours with Proposed Firewall Removals

3.5 ACOUSTICAL IMPACT EVALUATION

The predicted Substation sound pressure levels at the nearest noise sensitive receptors (R1 through R5) are summarized in Table 3-2 and are expected to range from 22 dBA to 32 dBA. As shown in Table 3-2, if the transformer firewall were to be removed the potential increase to the ambient sound level at the nearest noise sensitive receptors is expected to range from 0 to 4 dB.

For reference a 3 to 5 dB change in a continuous broadband noise is generally considered "perceptible to clearly noticeable" to the average listener. The projects noise sensitive receptor sound pressure levels increase with a range of 0 to 4 dB for continuous broadband noise, with the impact being “slightly noticeable” by the average listener.

Table 3-2 Acoustical Impacts of the Future Substation

NOISE SENSITIVE RECEPTOR	CALCULATED SUBSTATION (ONLY) SOUND LEVELS, dBA	CALCULATED FUTURE SUBSTATION (ONLY) SOUND LEVELS, dBA	POTENTIAL INCREASE, dB
R1	26	26	0
R2	22	22	0
R3	23	24	1
R4	28	32	4
R5	22	25	3

4.0 Conclusion

A predictive assessment was completed for Trapp Falls Substation in order to calculate the sound levels and the potential impacts associated with the removal of two transformer firewalls. Transformer sound levels provided by the manufacturer were used to calculate existing and future Substation sound levels. The expected change in sound level was determined for the surrounding area. The change in Substation sound levels associated with the removal of the transformer firewalls are not expected to be greater than 4 dB.

Appendix A. Acoustical Terminology

A.1 SOUND ENERGY

Sound is generated by the propagation of energy in the form of pressure waves. Being a wave phenomenon, sound is characterized by amplitude (sound pressure level, or SPL) and frequency (pitch). SPL is measured in decibels, dB. The decibel is the logarithmic ratio of a sound pressure to a reference sound pressure. Typically, an SPL of 0 dB corresponds to the threshold of human hearing. A 3 dB change in a continuous broadband SPL is generally considered "just barely perceptible" to the average listener. A 5 dB change is generally considered "clearly noticeable" and a 10 dB change is generally considered a doubling (or halving) of the apparent loudness.[3] For reference, the SPL and subjective loudness associated with common noise sources are shown in Table A-1.

Frequency is measured in hertz, Hz (cycles per second). Most sound sources (except those with pure tones) contain sound energy over a wide range of frequencies. In order to analyze sound energy over the range of frequencies, the sound energy is typically divided into sections called octave bands. Octave bands are identified by their center frequencies including 31.5, 63, 125, 250, 500 1000, 2000, 4000, and 8000 Hz. For more detailed analyses, narrow bands such as 1/3-octave bands are employed. The sum of the sound energy in all of the octave bands for a source represents the overall sound level of the source.

The normal human ear can hear frequencies ranging from 20 Hz to 20,000 Hz. At typical sound pressure levels, the human ear is more sensitive to sounds in the middle and high frequencies (1,000 to 8,000 Hz) than sounds in the low frequencies. Various weighting networks have been developed to simulate the frequency response of the human ear. The A-weighting network was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighting network emphasizes sounds in the middle to high frequencies and de-emphasizes sounds in the low frequencies. Most sound level instruments can apply these weighting networks automatically. Any sound level to which the A-weighting network has been applied is expressed in A-weighted decibels, dBA.

[3] Bies and C.H. Hansen, *Engineering Noise Control*, 2009.

Table A-1 Typical SPLs Associated with Common Noise Sources

SOUND PRESSURE LEVEL, dBA	SUBJECTIVE EVALUATION	COMMON OUTDOOR ENVIRONMENT OR SOURCE	COMMON INDOOR ENVIRONMENT OR SOURCE
140	Deafening	Jet aircraft at 75 ft	
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 ft	
120	Threshold of feeling	Elevated Train	Hard rock band
110	Extremely loud	Jet flyover at 1000 ft	Inside propeller plane
100	Very loud	Power mower, motorcycle at 25 ft, auto horn at 10 ft	
90	Very loud	Propeller plan flyover at 1000 ft, noisy urban street	Full symphony or band, food blender, noisy factory
80	Moderately loud	Diesel truck (40 mph) at 50 ft	Inside auto at high speed, garbage disposal, dishwasher
70	Loud	B-757 cabin during flight	Close conversation, vacuum cleaner, electric typewriter
60	Moderate	Air-conditioner condenser at 15 ft, near highway traffic	General office
50	Quiet		Private office
40	Quiet	Farm field with light breeze, birdcalls	Soft stereo music in residence
30	Very quiet	Quiet residential neighborhood	Bedroom, average residence (without TV and stereo)
20	Just audible		Human breathing
10	Threshold of hearing		
0			

Source: Adapted by Black & Veatch from *Architectural Acoustics*, by David M. Egan (1988) and *Architectural Graphic Standards*, by Ramsey and Sleeper (1994).

Appendix B. Shelton Substation – Trapp Falls Site Environmental Noise Impact Assessment

TRAP FALLS SUBSTATION TRANSFORMER FIRE BARRIER REPLACEMENT PROJECT

102 ARMSTRONG ROAD, SHELTON, CT 06484

ISSUED FOR CONSTRUCTION DRAWING SUBMISSION

LABELLA PROJECT NO. 2161892

UI PROJECT NO. 2161892

DRAWING LIST			
DWG. NO.	UI DRAWING NO.	SEQUENCE NO.	CONTENT
S-000			FIRE BARRIER COVER SHEET
S-001	55211-410	099341	FIRE BARRIER GENERAL NOTES AND DATA
S-002	55211-410A	099342	FIRE BARRIER SCHEDULE AND STATEMENT OF SPECIAL INSPECTIONS
S-100	55211-410B	099343	FIRE BARRIER PARTIAL DEMOLITION PLAN AND DEMO WALL SECTION
S-101	55211-410C	099344	FIRE BARRIER PARTIAL FOUNDATION PLAN AND SCHEDULES
S-201	55211-410D	099497	FIRE BARRIER WALL SECTION AND MASONRY DETAILS

LABELLA
300 State Street | Engineering
Suite 201 | Architecture
Rochester, NY 14614 | Environmental
P: (585) 454-6110 | Planning

No	Date	Revision	By	Chkd.	Engr.	Supv.

The United Illuminating Company

Drawn JRJ	Date 05/09/17	Scale:	
Chkd. ---	Design Engr. JRJ	Design Supv. ---	

COVER SHEET

TRAP FALLS

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
S-000		

GENERAL STRUCTURAL NOTES:

1. BUILDING CODE: 2012 CONNECTICUT BUILDING CODE
2. CONSTRUCTION LOADING: DURING CONSTRUCTION, THE GENERAL CONTRACTOR SHALL LIMIT AND CONTROL CONSTRUCTION LOADING, INCLUDING BUT NOT LIMITED TO:
   a. MATERIAL STOCKPILING AND EQUIPMENT TO PRECLUDE OVERSTRESSING, CONSTRUCTION LIVE LOAD IN EXCESS OF 20 PSF, OR DAMAGE TO ANY STRUCTURAL ELEMENT.
3. COORDINATION WITH OTHER DISCIPLINES: THE CONTRACTOR SHALL COORDINATE ALL STRUCTURAL WORK WITH THE OWNER PRIOR TO INSTALLATION.
4. EXISTING CONDITIONS: THE INFORMATION SHOWN ON THESE DOCUMENTS IS THE BEST REPRESENTATION OF EXISTING CONDITIONS AVAILABLE TO THE ENGINEER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY AND BRING TO THE ENGINEERS AND CONSTRUCTION MANAGER'S ATTENTION ANY DISCREPANCIES PRIOR TO COMMENCING WORK.
5. EXISTING STRUCTURES: ALL EXISTING STRUCTURES ADJACENT TO NEW WORK ARE TO BE ADEQUATELY PROTECTED AND/OR SUPPORTED DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ANY NEW OR EXISTING CONSTRUCTION DAMAGED WHILE WORK IS IN PROGRESS. CONTRACTOR SHALL COORDINATE WITH UNITED ILLUMINATING FOR OUTAGES REQUIRED DURING CONSTRUCTION. CONTRACTOR SHALL MAINTAIN SAFE CLEARANCES PER NESC/IEEE FROM LIVE PARTS IN SUBSTATION. PROVIDE TEMPORARY PROTECTION FOR WORKERS AS REQUIRED.
6. OPENINGS: THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING SIZE AND LOCATION OF ALL OPENINGS IN NEW AND EXISTING CONSTRUCTION WITH THE DISCIPLINE REQUIRING THEM.

FOUNDATION NOTES:

1. THE FOUNDATION DESIGN FOR NEW STRUCTURE IS BASED ON THE RECOMMENDATIONS INCLUDED IN THE GEOTECHNICAL EVALUATION REPORT TITLED "GEOTECHNICAL ENGINEERING AND ENVIRONMENTAL REPORT - TRAP FALLS SUBSTATION" AND PREPARED BY HALEY AND ALDRICH, INC. DATED MARCH, 2017. THE CONTRACTOR SHALL READ AND BE FAMILIAR WITH THIS REPORT AND THE RECOMMENDATIONS CONTAINED WITHIN. ALLOWABLE SOIL BEARING PRESSURE = 6000 PSF. FOUNDATIONS SHALL BEAR ON SOUND, NATIVE SOIL OR SELECT IMPORTED STRUCTURAL FILL.
2. TAKE ALL NECESSARY PRECAUTIONS WHEN EXCAVATING OR DRILLING ADJACENT TO EXISTING STRUCTURES TO AVOID DISTURBING EXISTING FOUNDATIONS. DO NOT EXCAVATE BELOW EXISTING FOUNDATIONS. CONTACT THE ENGINEER IF EXISTING CONDITIONS DIFFER FROM THOSE SHOWN ON THE DRAWING.
3. ALL EXCAVATIONS SHALL FULLY CONFORM TO LOCAL, STATE AND FEDERAL SAFETY REGULATIONS.
4. DO NOT BACKFILL AGAINST CONCRETE ELEMENTS UNTIL PLACED CONCRETE HAS REACHED 75% OF ITS SPECIFIED 28-DAY COMPRESSIVE STRENGTH.
5. BACKFILL BOTH SIDES OF FOUNDATION WALLS IN EQUAL, ALTERNATE LIFTS IN ORDER TO AVOID IMPOSING UNBALANCED LATERAL PRESSURE ON THE WALLS.
6. ALLOW TESTING AGENCY TO INSPECT AND APPROVE ALL COMPACTED SUBGRADE AND FILL LAYERS PRIOR TO FURTHER BACKFILL AND/OR PLACEMENT OF CONCRETE. TESTING AND INSPECTION RESULTS SHALL BE APPROVED BY THE GEOTECHNICAL ENGINEER.
7. THE SUITABILITY AND STABILITY OF EXISTING SOILS AND FILL, THE DEPTHS AND LATERAL LIMITS OF UNSUITABLE MATERIAL TO BE REMOVED, AND ADEQUACY OF FOUNDATION BEARING GRADES SHALL BE DETERMINED BY THE PROJECT GEOTECHNICAL ENGINEER.
8. BACKFILL AND FILL MATERIALS SHALL BE COMPACTED TO 95% OF MAXIMUM DRY DENSITY ACCORDING TO THE MODIFIED PROCTOR TEST (ASTM D-1557). ALL EXISTING BACKFILL SHALL BE RECOMPACTED AS SUCH TO PREVENT DIFFERENTIAL SETTLEMENT. COMPACTION OF SUBGRADE SHALL BE APPROVED BY THE PROJECT GEOTECHNICAL ENGINEER.
9. EXCAVATION AND BACKFILL OPERATIONS SHALL BE MAINTAINED IN A DRY CONDITION. SURFACE AND INFILTRATING WATER SHALL BE REMOVED BY SITE GRADING AND/OR BY PUMPING FROM SUMPS AS REQUIRED.
10. IF WEATHERED BEDROCK/ROCK FILL IS ENCOUNTERED, CONTRACTOR SHALL REMOVE AS REQUIRED FOR NEW FOUNDATIONS. IT IS ACCEPTABLE TO BEAR NEW FOUNDATIONS ON BEDROCK. THE SUITABILITY OF THE EXISTING SUBBASE SHALL BE DETERMINED BY THE PROJECT GEOTECHNICAL ENGINEER.

CONCRETE NOTES:

1. SUBMITTALS
   a. SUBMIT SHOP DRAWINGS FOR REINFORCING, INCLUDING ALL NECESSARY ACCESSORIES TO HOLD REINFORCING SECURELY IN PLACE. FOR REVIEW AND APPROVAL. WHERE RESUBMITTAL OF SHOP DRAWINGS IS REQUIRED, ALL REVISIONS SHALL BE CLEARLY IDENTIFIED BY CLOUDING AND REVISION TAGS.
   b. SUBMIT FOR REVIEW ALL MATERIALS AND METHODS FOR CONCRETE CURING.
2. PROVIDE THE FOLLOWING MINIMUM CONCRETE CLEAR COVER FOR REINFORCING STEEL, UNLESS OTHERWISE NOTED.:
   a. CONCRETE PLACED AGAINST EARTH: 3.0 IN.
   b. FORMED SURFACES IN CONTACT WITH EARTH OR EXPOSED TO WEATHER
   #6 THROUGH #18 BARS: 2.0 IN.
   #5 BARS AND SMALLER: 1.5 IN.
   c. FORMED SURFACES NOT IN CONTACT WITH EARTH OR EXPOSED TO WEATHER
   #14 AND #18 BARS: 1.5 IN.
   #11 BARS AND SMALLER: 1.0 IN.
3. ALL CONCRETE WORK, CONSTRUCTION, AND REINFORCING DETAILS SHALL CONFORM TO THE "CONNECTICUT BUILDING CODE, LATEST EDITION".
4. ALL REINFORCING STEEL SHALL BE DETAILED, FABRICATED AND PLACED IN ACCORDANCE WITH ACI 318.
5. ALL REINFORCING BARS SHALL CONFORM TO ASTM A615 GRADE 60.
6. ALL REINFORCING SHALL BE LAPPED OR EMBEDDED IN ACCORDANCE WITH ACI 318, UNLESS OTHERWISE NOTED.
7. PRIOR TO PLACEMENT OF CONCRETE, A FIELD REPRESENTATIVE SHALL BE INFORMED A MINIMUM OF 24 HOURS IN ADVANCE OF EACH PLACEMENT, TO ALLOW INSPECTION OF REINFORCING STEEL, AND PREPARATION FOR TAKING CONCRETE SAMPLES. INDEPENDENT TESTS ARE REQUIRED FOR ALL CONCRETE PLACEMENTS.
8. INSTALLATION OF REINFORCEMENT SHALL BE COMPLETED AT LEAST 48 HOURS PRIOR TO THE SCHEDULED CONCRETE PLACEMENT.
9. EPOXY ADHESIVE: HILTI HIT-HY 200 OR SIMPSON SET EPOXY.
10. GROUT: NON-METALLIC/NON-SHRINK STRUCTURAL GROUT. FIVE STAR GROUT OR APPROVED EQUAL.
11. PROTECT CONCRETE FROM PREMATURE DRYING IMMEDIATELY AFTER PLACEMENT. CURING OF CONCRETE SLABS MUST START WITHIN 2 HOURS AFTER FINISHING OPERATIONS ARE COMPLETE. CURING COMPOUNDS ARE PROHIBITED.
12. AIR-ENTRAINING ADMIXTURE SHALL CONFORM TO ASTM C260 AND WATER-REDUCING ADMIXTURES SHALL CONFORM TO ASTM C494

CONCRETE MIX NOTES:

1. SUBMIT MIX DESIGNS FOR REVIEW AND APPROVAL.
2. FOOTINGS: PROPORTION NORMAL-WEIGHT CONCRETE MIXTURE AS FOLLOWS:
   a. MINIMUM COMPRESSIVE STRENGTH: 5,000 PSI AT 28 DAYS.
   b. MAXIMUM WATER-CEMENTITOUS MATERIALS RATIO: 0.55.
   c. SLUMP LIMIT: 4 INCHES PLUS OR MINUS 1 INCH. IF ADMIXTURES ARE USED TO IMPROVE WORKABILITY, THE MAXIMUM SLUMP LIMITS MAY BE RELAXED WITH ENGINEER'S APPROVAL.
   d. AIR CONTENT: 6 PERCENT PLUS OR MINUS 1.5 PERCENT, AT POINT OF DELIVERY.
   e. COURSE AGGREGATE: 1-INCH NOMINAL MAXIMUM AGGREGATE SIZE.

CONCRETE TESTING AND INSPECTION NOTES:

1. TESTING AND INSPECTING: OWNER WILL ENGAGE A QUALIFIED TESTING AND INSPECTING AGENCY TO PERFORM TESTS AND INSPECTIONS AND PREPARE THE TEST REPORTS.
2. INSPECTIONS:
   a. STEEL REINFORCEMENT PLACEMENT.
   b. STEEL REINFORCEMENT WELDING.
   c. HEADED BOLTS AND STUDS.
   d. VERIFICATION OF USE OF REQUIRED DESIGN MIXTURE.
   e. CONCRETE PLACEMENT, INCLUDING CONVEYING AND DEPOSITING.
   f. CURING PROCEDURES AND MAINTENANCE OF CURING TEMPERATURE.
   g. VERIFICATION OF CONCRETE STRENGTH BEFORE REMOVAL OF SHORES AND FORMS AND VERIFICATION OF DESIGN STRENGTH PRIOR TO LOADING FOUNDATIONS.
3. CONCRETE TESTS: TESTING OF COMPOSITE SAMPLES OF FRESH CONCRETE OBTAINED ACCORDING TO ASTM C172 SHALL BE PERFORMED PRIOR TO LOADING FOUNDATIONS.
   a. TESTING FREQUENCY: OBTAIN TWO COMPOSITE SAMPLES FOR FOUNDATION POUR. IF MORE THAN ONE DELIVERY TRUCK, OBTAIN SAMPLES FROM EACH DELIVERY TRUCK IN EQUAL RATIO.
   b. SLUMP: ASTM C143; ONE TEST AT POINT OF PLACEMENT FOR EACH COMPOSITE SAMPLE, BUT NOT LESS THAN ONE TEST FOR EACH DAY'S POUR OF EACH CONCRETE MIXTURE. PERFORM ADDITIONAL TESTS WHEN CONCRETE CONSISTENCY APPEARS TO CHANGE.
   c. AIR CONTENT: ASTM C231, PRESSURE METHOD, FOR NORMAL-WEIGHT CONCRETE; ONE TEST FOR EACH COMPOSITE SAMPLE, BUT NOT LESS THAN ONE TEST FOR EACH DAYS POUR OF EACH CONCRETE MIXTURE.
   d. CONCRETE TEMPERATURE: ASTM C1064; ONE TEST HOURLY WHEN AIR TEMPERATURE IS 40 DEG F AND BELOW AND WHEN 80 DEG F AND ABOVE, AND ONE TEST FOR EACH COMPOSITE SAMPLE.
   e. UNIT WEIGHT: ASTM C567, FRESH UNIT WEIGHT OF STRUCTURAL CONCRETE; ONE TEST FOR EACH COMPOSITE SAMPLE, BUT NOT LESS THAN ONE TEST FOR EACH DAYS POUR OF EACH CONCRETE MIXTURE.
   f. COMPRESSION TEST SPECIMENS: ASTM C31.
   g. CAST AND LABORATORY CURE ONE SET OF TWO STANDARD CYLINDER SPECIMENS FOR EACH COMPOSITE SAMPLE. COORDINATE NUMBER OF TESTS WITH OWNER TO DETERMINE APPROPRIATE NUMBER OF CYLINDERS FOR MACHINE INSTALLATION.
   h. COMPRESSIVE-STRENGTH TESTS: ASTM C39; TEST ONE SET OF TWO LABORATORY-CURED SPECIMENS AT 7 DAYS, AT 10 DAYS, AT 14 DAYS, AND ONE SET OF TWO SPECIMENS AT 28 DAYS.
   i. A COMPRESSIVE-STRENGTH TEST SHALL BE THE AVERAGE COMPRESSIVE STRENGTH FROM A SET OF TWO SPECIMENS OBTAINED FROM SAME COMPOSITE SAMPLE AND TESTED AT AGE INDICATED.
   j. STRENGTH: CONCRETE MIXTURE WILL BE SATISFACTORY IF COMPRESSIVE-STRENGTH TEST EQUALS OR EXCEEDS SPECIFIED COMPRESSIVE STRENGTH AND NO INDIVIDUAL CYLINDER COMPRESSIVE-STRENGTH TEST VALUE FALLS BELOW SPECIFIED COMPRESSIVE STRENGTH BY MORE THAN 500 PSI.
   k. TEST RESULTS SHALL BE REPORTED IN WRITING TO ENGINEER, CONCRETE MANUFACTURER, AND CONTRACTOR WITHIN 48 HOURS OF TESTING. REPORTS OF COMPRESSIVE-STRENGTH TESTS SHALL CONTAIN PROJECT IDENTIFICATION NAME AND NUMBER, DATE OF CONCRETE PLACEMENT, NAME OF CONCRETE TESTING AND INSPECTING AGENCY, LOCATION OF CONCRETE BATCH IN WORK, DESIGN COMPRESSIVE STRENGTH AT 28 DAYS, CONCRETE MIXTURE PROPORTIONS AND MATERIALS, COMPRESSIVE BREAKING STRENGTH, AND TYPE OF BREAK.
   l. NONDESTRUCTIVE TESTING: IMPACT HAMMER, SONOSCOPE, OR OTHER NONDESTRUCTIVE DEVICE MAY BE PERMITTED BY ENGINEER BUT WILL NOT BE USED AS SOLE BASIS FOR APPROVAL OR REJECTION OF CONCRETE.
   m. ADDITIONAL TESTS: AT CONTRACTOR'S EXPENSE, TESTING AND INSPECTING AGENCY SHALL MAKE ADDITIONAL TESTS OF CONCRETE WHEN TEST RESULTS INDICATE THAT SLUMP, AIR ENTRAINMENT, COMPRESSIVE STRENGTHS, OR OTHER REQUIREMENTS HAVE NOT BEEN MET, AS DIRECTED BY ENGINEER. TESTING AND INSPECTING AGENCY MAY CONDUCT TESTS TO DETERMINE ADEQUACY OF CONCRETE BY CORED CYLINDERS COMPLYING WITH ASTM C42 OR BY OTHER METHODS AS DIRECTED BY THE ENGINEER.
   n. ADDITIONAL TESTING AND INSPECTING, AT CONTRACTOR'S EXPENSE, WILL BE PERFORMED TO DETERMINE COMPLIANCE OF REPLACED OR ADDITIONAL WORK WITH SPECIFIED REQUIREMENTS.
   o. AT CONTRACTOR'S EXPENSE, CORRECT DEFICIENCIES IN THE WORK THAT TEST REPORTS AND INSPECTIONS INDICATE DOES NOT COMPLY WITH THE CONTRACT DOCUMENTS.

MASONRY NOTES:

1. SUBMITTALS:
   a. SUBMIT SHOP DRAWINGS FOR MASONRY UNITS, GROUT MIXES, MORTAR AND REINFORCING STEEL FOR REVIEW AND APPROVAL WHERE SUBMITTAL OF SHOP DRAWINGS IS REQUIRED, ALL REVISIONS SHALL BE CLEARLY IDENTIFIED BY CLOUDING AND REVISION TAGS.
2. MASONRY CONSTRUCTION SHALL CONFORM TO THE LATEST EDITION OF THE "BUILDING CODE REQUIREMENTS FOR CONCRETE MASONRY STRUCTURES" (ACI-530).
3. ALL CONCRETE BLOCK SHALL CONFORM TO ASTM-C90. PROVIDE NORMAL WEIGHT UNITS WITH MINIMUM AVERAGE NET-AREA COMPRESSIVE STRENGTH OF 2000 PSI.
   a. FOR REINFORCED MASONRY, USE TYPE S.
4. MORTAR FOR UNIT MASONRY: COMPLY WITH ASTM C 270. PROVIDE THE FOLLOWING TYPES OF MORTAR FOR APPLICATIONS BELOW:
5. PLACE GROUT IN ALL CELLS. GROUT SHALL BE PLACED IN LIFTS NOT TO EXCEED 4'-0".
6. REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60. REINFORCING BARS MARKED "CONTINUOUS" SHALL BE LAPPED PER ACI 530. CONSTRUCT LAP SPLICES AND EMBEDMENT LENGTHS PER ACI 530. MAINTAIN A MINIMUM OF 1/2" CLEARANCE BETWEEN REINFORCING BARS AND MASONRY. PROVIDE #5 BARS UNLESS OTHERWISE NOTED.
7. JOINT REINFORCEMENT FACTORY FABRICATED FROM COLD-DRAWN STEEL WIRE, ASTM A 82, LADDER DESIGN, WITH 9 GAGE DEFORMED STEEL WIRE LONGITUDINAL RODS WELDED TO 9 GAGE STEEL WIRE CROSS TIES SPACED 16 INCHES ON CENTER MAXIMUM; WIDTH 1-1/2 TO 2 INCHES LESS THAN TOTAL WALL THICKNESS. FURNISH FACTORY FABRICATED CORNER AND TEE SECTIONS FOR CORNERS AND WALL INTERSECTIONS.
8. DESIGN AND PROVIDE TEMPORARY BRACING OF MASONRY WALLS DURING CONSTRUCTION. BRACING SHALL REMAIN IN PLACE UNTIL PERMANENT SUPPORTING ELEMENTS OF THE STRUCTURE HAVE BEEN CONSTRUCTED. BRACING SHALL FULLY CONFORM TO ALL OSHA REQUIREMENTS.
9. ALL MASONRY COURSING SHOWN IN SECTION AND ELEVATION IS SCHEMATIC. MASONRY MAY NEED TO BE CUT AS REQUIRED.
10. CONDUITS, PIPES, AND SLEEVES IN MASONRY SHALL BE NO CLOSER THAN 3 DIAMETERS ON CENTER. ALUMINUM SHALL NOT BE USED. COORDINATE WITH UNITED ILLUMINATING FOR REQUIRED CONDUIT PENETRATIONS.

SPECIAL INSPECTION NOTES:

1. ALL PREFABRICATED ITEMS SHALL BE MANUFACTURED BY APPROVED AND CERTIFIED SHOPS.
2. SPECIAL INSPECTIONS WILL BE REQUIRED FOR THIS PROJECT. THE CONTRACTOR SHALL COORDINATE ALL WORK WITH THE OWNER'S TESTING AND SPECIAL INSPECTION REPRESENTATIVES.
3. SEE CHART FOR STRUCTURAL SPECIAL INSPECTIONS AND ADDITIONAL INFORMATION.

GENERAL DEMOLITION NOTES:

1. DEMOLISH AND REMOVE EXISTING CONSTRUCTION ONLY TO THE EXTENT REQUIRED BY NEW CONSTRUCTION AND AS INDICATED. USE METHODS REQUIRED TO COMPLETE THE WORK WITHIN LIMITATIONS OF GOVERNING REGULATIONS AND AS FOLLOWS:
   a. PROCEED WITH SELECTIVE DEMOLITION SYSTEMATICALLY, FROM HIGHER TO LOWER LEVEL. COMPLETE SELECTIVE DEMOLITION OPERATIONS ABOVE EACH FLOOR OR TIER BEFORE DISTURBING SUPPORTING MEMBERS ON THE NEXT LOWER LEVEL.
   b. NEATLY CUT OPENINGS AND HOLES PLUMB, SQUARE, AND TRUE TO DIMENSIONS REQUIRED. USE CUTTING METHODS LEAST LIKELY TO DAMAGE CONSTRUCTION TO REMAIN OR ADJOINING CONSTRUCTION. USE HAND TOOLS OR SMALL POWER TOOLS DESIGNED FOR SAWING OR GRINDING, NOT HAMMERING AND CHOPPING, TO MINIMIZE DISTURBANCE OF ADJACENT SURFACES. TEMPORARILY COVER OPENINGS TO MAINTAIN A WATERTIGHT CONDITION UNTIL PERMANENT CONSTRUCTION IS COMPLETE.
   c. CUT OR DRILL FROM THE EXPOSED OR FINISHED SIDE INTO CONCEALED SURFACES. AVOID MARRING EXISTING FINISHED SURFACES.
   d. NO FLAME CUTTING.
   e. REMOVE DECAYED, VERMIN-INFESTED, OR OTHERWISE DANGEROUS OR UNSUITABLE NON-HAZARDOUS MATERIALS. PROMPTLY DISPOSE OF OFF-SITE.
   f. ASBESTOS CONTAMINATED MATERICAL (ACM) / HAZARDOUS MATERIALS:
   i. NO ACM SURVEY HAS BEEN PERFORMED FOR THIS PROJECT
   g. REMOVE STRUCTURAL FRAMING MEMBERS AND LOWER TO GROUND BY METHOD SUITABLE TO AVOID FREE FALL AND TO PREVENT GROUND IMPACT OR DUST GENERATION.
   h. LOCATE SELECTIVE DEMOLITION EQUIPMENT AND REMOVE DEBRIS AND MATERIALS SO AS NOT TO IMPOSE EXCESSIVE LOADS ON SUPPORTING WALLS, FLOORS, OR FRAMING.
   i. DISPOSE OF DEBRIS OFF-SITE PROMPTLY AT CONTRACTOR'S EXPENSE AND IN ACCORDANCE WITH ALL APPLICABLE REGULATIONS AND CODES.
2. BUILDING ELEMENTS TO REMAIN: DO NOT DEMOLISH BUILDING ELEMENTS BEYOND LIMITS INDICATED.
3. EXISTING ITEMS TO REMAIN: PROTECT CONSTRUCTION INDICATED TO REMAIN AGAINST DAMAGE AND SOILING DURING SELECTIVE DEMOLITION. WHEN PERMITTED BY THE ENGINEER OF RECORD AND/OR THE OWNER, ITEMS MAY BE REMOVED TO A SUITABLE, PROTECTED STORAGE LOCATION DURING SELECTIVE DEMOLITION (AND CLEANED) AND REINSTALLED IN THEIR ORIGINAL LOCATIONS AFTER SELECTIVE DEMOLITION OPERATIONS ARE COMPLETE. COMPLY WITH INSTALLATION REQUIREMENTS FOR NEW MATERIALS AND EQUIPMENT. PROVIDE CONNECTIONS, SUPPORTS, AND MISCELLANEOUS MATERIALS NECESSARY TO MAKE ITEM FUNCTIONAL FOR USE INDICATED.
4. SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS:
   a. REINFORCED CONCRETE: DEMOLISH IN SMALL SECTIONS. SAW CUT CONCRETE TO A DEPTH OF AT LEAST 3/4 INCH AT JUNCTURES WITH CONSTRUCTION TO REMAIN. DISLODGE CONCRETE FROM REINFORCEMENT AT PERIMETER OF AREAS BEING DEMOLISHED. CUT REINFORCEMENT, AND THEN REMOVE REMAINDER OF CONCRETE INDICATED FOR SELECTIVE DEMOLITION USING MAXIMUM 15-LB CHIPPING HAMMER. NEATLY TRIM OPENINGS TO DIMENSIONS INDICATED.
   b. GENERAL: EXCEPT FOR ITEMS OR MATERIALS INDICATED TO BE RECYCLED, REUSED, SALVAGED, REINSTALLED, OR OTHERWISE INDICATED TO REMAIN OWNER'S PROPERTY, REMOVE DEMOLISHED MATERIALS FROM PROJECT SITE AND LEGALLY DISPOSE OF THEM IN AN EPA-APPROVED LANDFILL.
5. DO NOT ALLOW DEMOLISHED MATERIALS TO ACCUMULATE ON-SITE.
6. REMOVE AND TRANSPORT DEBRIS IN A MANNER THAT WILL PREVENT SPILLAGE ON ADJACENT SURFACES AND AREAS.
7. REMOVE DEBRIS FROM ELEVATED PORTIONS OF BUILDING BY CHUTE, HOIST, OR OTHER DEVICE THAT WILL CONVEY DEBRIS TO GRADE LEVEL IN A CONTROLLED DESCENT.
8. COMPLY WITH REQUIREMENTS SPECIFIED IN DIVISION 01 SECTION "CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL."
9. BURNING: DO NOT BURN DEMOLISHED MATERIALS.
10. DISPOSAL:
    TRANSPORT DEMOLISHED MATERIALS OFF OWNER'S PROPERTY AND LEGALLY DISPOSE OF THEM.
11. CLEANING:
    CLEAN ADJACENT STRUCTURES AND IMPROVEMENTS OF DUST, DIRT, AND DEBRIS CAUSED BY ALL DEMOLITION OPERATIONS. RETURN ADJACENT AREAS TO CONDITION EXISTING BEFORE DEMOLITION OPERATIONS BEGAN.

MISCELLANEOUS NOTES

1. ALL ELEVATIONS ARE REFERENCED FROM FINISHED MAIN FLOOR ELEVATION [0' - 0"]

STRUCTURAL ABBREVIATIONS LEGEND

ACI	AMERICAN CONCRETE INSTITUTE
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWS	AMERICAN WELDING SOCIETY
APPROX.	APPROXIMATE
ARCH.	ARCHITECT/ARCHITECTURAL
B.F.	BOTTOM FACE
B.O.	BOTTOM OF
CIP	CAST-IN-PLACE
CONC.	CONCRETE
C.J.	CONSTRUCTION JOINT
CONT.	CONTINUOUS
COV.	COVER
DIA.	DIAMETER
E.F.	EACH FACE
E.S.	EACH SIDE
E.W.	EACH WAY
ELEV.	ELEVATION
EQ.	EQUAL
EXIST.	EXISTING
(E)	EXISTING
F.F.E.	FINISHED FLOOR ELEVATION
FW	FLATWISE
F.D.	FLOOR DRAIN
F	FOOTING
FTG.	FOOTING
FNDN.	FOUNDATION
GA.	GAGE
GALV.	GALVANIZED
H.P.	HIGH POINT
H.S.	HIGH STRENGTH
HORIZ.	HORIZONTAL
I.F.	INSIDE FACE
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
MANUF.	MANUFACTURER
MAX.	MAXIMUM
MECH.	MECHANICAL
MIN.	MINIMUM
(N)	NEW
O.C.	ON CENTER
O.F.	OUTSIDE FACE
P	PIER (SEE SCHEDULE)
PLF	POUNDS PER LINEAR FOOT
REINF.	REINFORCING, REINFORCEMENT
S.J.	SAW-CUT CONTROL JOINT
SPA., SP.	SPACE OR SPACING
STD.	STANDARD
SDI	STEEL DECK INSTITUTE
TSF	TON PER SQUARE FOOT
T&B	TOP & BOTTOM
T.F.	TOP FACE
T.O.	TOP OF
T.O.S.	TOP OF STEEL
TYP.	TYPICAL
U.O.N.	UNLESS OTHERWISE NOTED
V.I.F.	VERIFY IN FIELD
VERT.	VERTICAL
W.W.R.	WELDED WIRE REINFORCEMENT
W/	WITH
W.P.	WORKING POINT

STRUCTURAL DESIGN TABLE
(IN ACCORDANCE WITH IBC)

BUILDING DATA:			
LOCATION		104 ARMSTRONG ROAD, SHELTON, CT 06484	
BUILDING OCCUPANCY RISK CATEGORY		IV	IBC TABLE 1604.5
BUILDING USE GROUP		U	IBC SECTION 300
GEOTECHNICAL INFORMATION:			
ULTIMATE BEARING PRESSURE		6,000 PSF	
WIND LOAD (MAIN WIND-FORCE RESISTING SYSTEM):			
ANALYSIS PROCEDURE		DIRECTIONAL PROCEDURE	ASCE 7-10 CHAPTER 27
ULTIMATE DESIGN WIND SPEED (3-SECOND GUST)	Vult	130 mph	ASCE 7-10 SECTION 26.5
WIND DIRECTIONALITY FACTOR	Kd	0.85	ASCE 7-10 SECTION 26.6
EXPOSURE CATEGORY		B	ASCE 7-10 SECTION 26.7
TOPOGRAPHIC FACTOR	Kzt	1.00	ASCE 7-10 SECTION 26.8
GUST-EFFECT FACTOR	G	0.85	ASCE 7-10 SECTION 26.9
VELOCITY PRESSURE EXPOSURE COEFFICIENT	Kz	0.63	ASCE 7-10 TABLE 27.3-1
VELOCITY PRESSURE	q	23.3 PSF	ASCE 7-10 SECTION 27.3.2
FORCE COEFFICIENT	Cf_a	1.44	ASCE 7-10 SECTION 27.4
MINIMUM WALL WIND PRESSURE	Pmin	16 PSF	ASCE 7-10 SECTION 27.4.7
MAXIMUM WALL WIND PRESSURE	Pmax	28.6 PSF	ASCE 7-10 SECTION 27.4.7
NOTES		WIND LOADS ARE CALCULATED FROM THESE PARAMETERS FOR EACH SURFACE OF THE MAIN WIND-FORCE RESISTING SYSTEM.	
EARTHQUAKE LOAD:			
SOIL SITE CLASSIFICATION		C	ASCE 7-10 SECTION 20.3
SPECTRAL RESPONSE ACCELERATION AT 0.2 SEC	Ss	0.199g	ASCE 7-10 FIGURE 22-1
SPECTRAL RESPONSE ACCELERATION AT 1.0 SEC	S1	0.064g	ASCE 7-10 SECTION 11.4.1
SEISMIC IMPORTANCE FACTOR	Ie	1.5	ASCE 7-10 TABLE 1.5-2
DESIGN SPECTRAL RESPONSE COEFFICIENT	SDS	0.159g	ASCE 7-10 SECTION 11.4.4
DESIGN SPECTRAL RESPONSE COEFFICIENT	SD1	0.073g	ASCE 7-10 SECTION 11.4.4
SEISMIC DESIGN CATEGORY		C	ASCE 7-10 TABLE 11.6-(1&2)
EFFECTIVE SEISMIC WEIGHT OF THE STRUCTURE	W	77.2 KIPS	ASCE 7-10 SECTION 12.8
SEISMIC RESPONSE COEFFICIENT	Cs	0.119	ASCE 7-10 SECTION 12.8.1.1
SEISMIC BASE SHEAR	V	9.2 KIPS	ASCE 7-10 SECTION 12.8.1

LABELLA
300 State Street | Engineering
Suite 201 | Architecture
Rochester, NY 14614 | Environmental
P: (585) 454-6110 | Planning

No	Date	Revision	By	Chkd.	Engr.	Supv.

The United Illuminating Company

Drawn JTW | Date 05/09/17 | Scale:
Chkd. JRJ | Design Engr. JTW | Design Supv. JRJ

GENERAL NOTES AND DESIGN DATA

TRAP FALLS

CAD FILE NAME S-001 | SEQUENCE No. 099341 | DRAWING NUMBER 55211-410

STATEMENT OF SPECIAL INSPECTIONS

LOCATION	104 ARMSTRONG ROAD, SHELTON, CT 06484
OWNER	UNITED ILLUMINATING COMPANY
DESIGN PROFESSIONAL IN CHARGE	JOSEPH JENKINS

This statement of Special Inspections is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the International Building Code 2015 (IBC). It includes a schedule of Special Inspection services applicable to this project as well as the name of the Special Inspection coordinator and the identity of other approved agencies to be retained for conducting these inspections and tests. This Statement of Special Inspections encompasses the following disciplines: STRUCTURAL. The Special Inspection Coordinator shall keep records of all inspections and shall furnish inspection reports to the Building Official and the Registered Design Professional in Responsible Charge (RDP). Discovered discrepancies shall be brought to the immediate attention of the contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the RDP. The Special Inspection program does not relieve the contractor of his or her responsibility for quality assurance.

Interim reports shall be submitted to the Building Official and the RDP.

A Final Report of Special Inspections documenting completion of all required Special Inspections, testing, and correction of any discrepancies noted in the inspections shall be submitted by the special Inspection Coordinator prior to issuance of a Certificate of Use and Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the contractor.

Interim reports shall be submitted monthly.

In accordance with IBC 2015, the Observations and Inspections listed in the Schedule of Special Inspections are required.

SCHEDULE OF INSPECTION AND TESTING AGENCIES

SPECIAL INSPECTION AGENCIES	FIRM	ADDRESS	TELEPHONE No.
Special Inspection Coordinator	TBD	TBD	(###) ###-####
Inspector	TBD	TBD	(###) ###-####

Note: The inspectors and testing agencies shall be engaged by the Owner or the Owner's Agent in accordance with Section 1703.1.1 of the 2015 International Building Code (IBC 2015), and not by the Contractor or Subcontractor whose work is to be inspected or tested. An approved agency shall be objective, competent and independent from the contractor responsible for the work being inspected. The agency shall also disclose to the building official and the registered design professional in responsible charge possible conflicts of interest so that objectivity can be confirmed.

STATEMENT OF CONTRACTORS RESPONSIBILITY

In accordance with IBC 2015 Section 1704.4, each contractor responsible for the construction of a main wind or seismic force-resisting system, designated seismic system or a wind or seismic force-resisting component listed in the statement of special inspections above shall submit a written statement of responsibility to the building official and the owner or the owner's authorized agent prior to the commencement of work on the system or component. The contractor's statement of responsibility shall contain acknowledgement of awareness of the special requirements contained in the statement of special inspections.

QUALIFICATIONS OF INSPECTORS AND TESTING TECHNICIANS

The qualifications of all personnel performing Special Inspection and testing activities are subject to the approval of the Building Official. The credentials of all Inspectors and testing technicians shall be provided.

Key for Minimum Qualifications of Inspection Agents:

When the Registered Design Professional in Responsible Charge deems it appropriate that the individual performing a stipulated test of inspection have a specific certification or license as indicated below, such designation shall appear below the Agency Number on the Schedule.

PE/SE	Structural Engineer - a licensed PE specializing in the design of building structures
PE/GE	Geotechnical Engineer - a licensed PE specializing in soil mechanics and foundations
EIT	Engineer - In - Training - a graduate engineer who as passed the Fundamentals of Engineering examination
AMERICAN CONCRETE INSTITUTE (ACI) CERTIFICATION	
ACI-CFTT	Concrete Field Testing Technician - Grade 1
ACI-CCSI	Concrete Construction Special Inspector
ACI-LTT	Laboratory Testing Technician - Grade 1&2
ACI-STT	Strength Testing Technician
AMERICAN WELDING SOCIETY (AWS) CERTIFICATION	
AWS-CWI	Certified Welding Inspector
AWS/AISC-SSI	Certified Structural Steel Inspector
INTERNATIONAL CODE COUNCIL (ICC) CERTIFICATION	
ICC-SMSI	Structural Masonry Special Inspector
ICC-SWSI	Structural Steel and Welding Special Inspector
ICC-SFSI	Spray-Applied Fireproofing Special Inspector
ICC-PCSI	Prestressed Concrete Special Inspector
ICC-RCSI	Reinforced Concrete Special Inspector
NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES (NICET)	
NICET-CT	Concrete Technician - Levels I, II, III, & IV
NICET-ST	Soil Technicians - Levels I, II, III & IV
NICET-GET	Geotechnical Engineering Technician - Levels I, II, III & IV

REFERENCES

CODE/STANDARD	TITLE
ACI 301	Standard Specifications for Structural Concrete.
ACI 318	Building Code Requirements for Structural Concrete
ACI 530.1/ASCE 6/TMS 602	Specifications for Masonry Structures
AISC 360	Specifications for Structural Steel Buildings
ASTM A6	Specifications for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use.
ASTM A568	Specifications for Steel Sheet, Carbon and High Stength, Low-Alloy, Hot-Rolled and Cold Rolled.
ASTM C31	Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C94	Specifications for Ready-Mixed Concrete
ASTM C109	Test Methods for Compressive Stength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimins)
ASTM C138	Test Method for Unit Weight, Yeild and Air Content (Gravimetric) of Concrete
ASTM C143	Test Method for Slump of Hydraulic Cement Concrete.
ASTM C172	Practice for Sampling Freshly Mixed Concrete
ASTM C173	Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C231	Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C567	Test Method for Unit Weight of Structural Lightweight Concrete
ASTM C1090	Test Method for Temperature of Freshly Mixed Portland Cement Concrete
ASTM C1064	Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic Cement Grout
ASTM C1314	Test Method for Constructing and Testing Masonry Prisms Used to Determine Compliance with Specified Compressive Strength of Masonry
AWS D1.1	Structural Welding Code - Steel.
APPLICABLE BUILDING CODE	International Building Code 2015 with New York Amendments
RCSC	Specification for Structural Joints Using High Stength Bolts.

SCHEDULE OF STRUCTURAL SPECIAL INSPECTIONS

THE FOLLOWING TABLES COMPRISES THE STRUCTURAL SPECIAL INSPECTION REQUIREMENTS FOR THIS PROJECT IN ACCORDANCE WITH CHAPTER 17 OF THE 2015 INTERNATIONAL BUILDING CODE. REFER TO THE PROJECT SPECIFICATIONS FOR REQUIRED QUALIFICATIONS OF ALL PERSONNEL PERFORMING SPECIAL INSPECTION ACTIVITIES AND ADDITIONAL TESTING INFORMATION.

EARTHWORK - REQUIREMENTS FOR SPECIAL INSPECTION & TESTING

AREAS OF INSPECTION & TESTING	FREQUENCY OF INSPECTION OR TESTING	REFERENCE STANDARD	IBC REFERENCE
1. VERIFY MATERIALS BELOW SHALLOW FOUNDATIONS ARE ADEQUATE TO ACHIEVE THE DESIGN BEARING CAPACITY.	PERIODIC	-	1705.6
2. VERIFY EXCAVATIONS ARE EXTENDED TO PROPER DEPTH AND HAVE REACHED PROPER MATERIAL.	PERIODIC		
3. PERFORM CLASSIFICATION AND TESTING OF COMPACTED FILL MATERIALS	PERIODIC		
4. VERIFY USE OF PROPER MATERIALS, DENSITIES, AND LIFT THICKNESSES DURING PLACEMENT AND COMPACTION OF COMPACTED FILL.	CONTINUOUS		
5. PRIOR TO PLACEMENT OF COMPACTED FILL, INSPECT SUBGRADE AND VERIFY THAT SITE HAS BEEN PREPARED PROPERLY.	PERIODIC		

CAST-IN-PLACE CONCRETE - REQUIREMENTS FOR SPECIAL INSPECTION & TESTING

AREAS OF INSPECTION & TESTING	FREQUENCY OF INSPECTION OR TESTING	REFERENCE STANDARD	IBC REFERENCE
1. INSPECT REINFORCEMENT, INCLUDING PRESTRESSING TENDONS, AND VERIFY PLACEMENT.	PERIODIC	ACI 318 CH. 20, 25.2, 25.3, 26.6.1 - 26.6.3	1908.4
2. REINFORCING BAR WELDING: A. VERIFY WELDABILITY OF REINFORING BARS OTHER THAN ASTM A706; B. INSPECT SINGLE-PASS FILLET WELDS, MAXIMUM 5/16"; AND C. INSPECT ALL OTHER WELDS.	 PERIODIC PERIODIC CONTINUOUS	AWS D1.4 ACI 318: 26.6.4	-
3. INSPECT ANCHORS CAST IN CONCRETE	PERIODIC	ACI 318: 17.8.2	-
4. INSPECT ANCHORS POST-INSTALLED IN HARDENED CONCRETE MEMBERS. A. ADHESIVE ANCHORS INSTALLED IN HORIZONTALLY OR UPWARDLY INCLINED ORIENTATIONS TO RESISTE SUSTAINED TENSION LOADS. B. MECHANICAL ANCHORS AND ADHESIVE ANCHORS.	 CONTINUOUS PERIODIC	 ACI 318: 17.8.2.4 ACI 318: 17.8.2	-
5. VERIFY USE OF REQUIRED DESIGN MIX.	PERIODIC	ACI 318: CH. 19, 26.4.3, 26.4.4	1904.1, 1904.2, 1908.2, 1908.3
6. PRIOR TO CONRETE PLACEMENT, FABRICATE SPECIMENS FOR STRENGTH TESTS, PERFORM SLUMP AND AIR CONTENT TESTS, AND DETERMINE THE TEMPERATURE OF THE CONCRETE.	CONTINUOUS	ASTM C172 ASTM C31 ACI 318: 26.4, 26.12	1908.10
7. INSPECT CONRETE AND SHOTCRETE PLACEMENT FOR PROPER APPLICAION TECHNIQUES.	CONTINUOUS	ACI 318: 26.5	1908.6, 1908.7, 1908.8
8. VERIFY MAINTENANCE OF SPECIFIED CURING TEMPERATURE AND TECHNIQUES.	PERIODIC	ACI 318: 26.5.3 - 26.5.5	1908.9
9. INSPECT PRESTRESSED CONCRETE FOR: A. APPLICATION OF PRESTRESSING FORCES; AND B. GROUTING OF BONDED PRESTRESSING TENDONS.	 CONTINUOUS CONTINUOUS	ACI 318: 26.10	-
10. INSPECT ERECTION OF PRECAST CONCRETE MEMBERS.	PERIODIC	ACI 318: CH. 26.8	-
11. VERIFY IN-SITU CONCRETE STRENGTH, PRIOR TO STRESSING OF TENDONS IN POST-TENSIONED CONCRETE AND PRIOR TO REMOVAL OF SHORES AND FORMS FROM BEAMS AND STRUCTURAL SLABS.	PERIODIC	ACI 318: 26.11.2	-
12. INSPECT FORMWORK FOR SHAPE, LOCATION AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED.	PERIODIC	ACI 318: 26.11.2 (b)	-

MASONRY CONSTRUCTION - REQUIREMENTS FOR LEVEL B SPECIAL INSPECTION & TESTING

AREAS OF INSPECTION & TESTING	FREQUENCY OF INSPECTION OR TESTING	REFERENCE STANDARD	IBC REFERENCE
1. VERIFY COMPLIANCE WITH THE APPROVED SUBMITTALS	PERIODIC	-	1705.4
2. AS MASONRY CONSTRUCTION BEGINS, VERIFY THAT THE FOLLOWING ITEMS ARE IN COMPLIANCE: A. PROPORTIONS OF SITE-PREPARED MORTAR. B. CONSTRUCTION OF MORTAR JOINTS. C. GRADE AND SIZE OF PRESTRESSING TENDONS AND ANCHORAGES. D. LOCATION OF REINFORCEMENT, CONNECTORS, AND PRESTRESSING TENDONS, AND ANCHORAGES. E. PRESTRESSING TECHNIQUE. F. PROPERTIES OF THIN-BED MORTAR FOR AAC MASONRY.	 PERIODIC PERIODIC PERIODIC PERIODIC PERIODIC PERIODIC	-	
3. PRIOR TO GROUTING, VERIFY THAT THE FOLLOWING ARE IN COMPLIANCE: A. GROUT SPACE B. GRADE, TYPE AND SIZE OF REINFORCEMENT AND ANCHOR BOLTS, AND PRESTRESSING TENDONS AND ANCHORAGES. C. PLACEMENT OF REINFORCEMENT, CONNECTORS, AND PRESTRESSING TENDONS AND ANCHORAGES. D. PROPORTIONS OF SITE-PREPARED GROUT AND PRESTRESSING GROUT FOR BONDED TENDONS. E. CONSTRUCTION OF MORTAR JOINTS.	 PERIODIC PERIODIC PERIODIC PERIODIC PERIODIC	 SEC. 6.1 SEC. 6.1, 6.2.1, 6.2.6, 6.2.7	
4. VERIFY DURING CONSTRUCTION: A. SIZE AND LOCATION OF STRUCTURAL ELEMENTS. B. TYPE, SIZE, AND LOCATION OF ANCHORS, INCLUDING OTHER DETAILS OF ANCHORAGES OF MASONRY TO STRUCTURAL MEMBERS, FRAMES, OR OTHER CONSTRUCTION. C. WELDING OF REINFORCEMENT. D. PREPARATION, CONSTRUCTION, AND PROTECTION OF MASONRY DURING COLE WEATHER (TEMPERATURES BELOW 40) OR HOT WEATHER (TEMPERATURES ABOVE 90). E. APPLICATION AND MEASUREMENT OF PRESTRESSING FORCE. F. PLACEMENT OF GROUT AND PRESTRESSING GROUT FOR BONDED TENDONS IS IN COMPIANCE G. PLACEMENT OF AAC MASONRY UNITS AND CONSTRUCTION OF THIN-BED MORTAR JOINTS.	 PERIODIC PERIODIC CONTINUOUS PERIODIC CONTINUOUS CONTINUOUS PERIODIC	 SEC. 1.2.1(E), 6.1.4.3, 6.2.1 SEC. 8.1.6.7.2., 9.3.3.4(C), 11.3.3.4(B)	
5. OBSERVE PREPARATION OF GROUT SPECIMENS, MORTAR SPECIMENS, AND/OR PRISMS.	PERIODIC		

LABELLA
300 State Street | Engineering
Suite 201 | Architecture
Rochester, NY 14614 | Environmental
P: (585) 454-6110 | Planning

No	Date	Revision	By	Chkd.	Engr.	Supv.

The United Illuminating Company

Drawn JTW | Date 05/09/17 | Scale:
Chkd. JRJ | Design Engr. JTW | Design Supv. JRJ

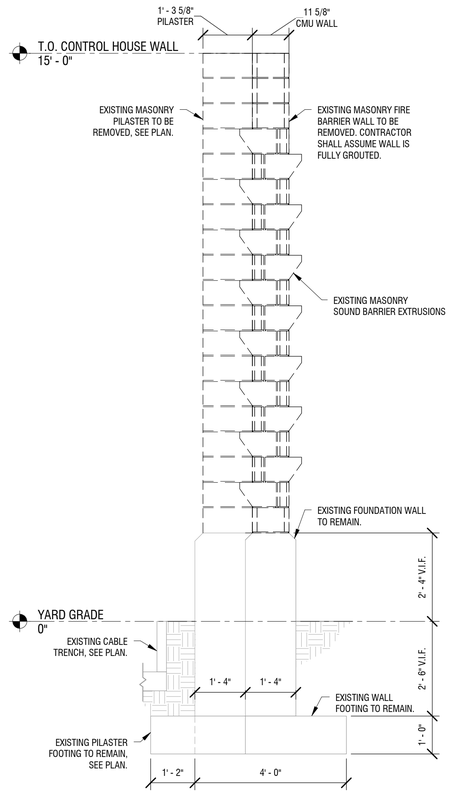
SCHEDULE AND STATEMENT OF SPECIAL INSPECTIONS

TRAP FALLS

CAD FILE NAME S-002 | SEQUENCE No. 099342 | DRAWING NUMBER 55211-410A

DEMOLITION LEGEND

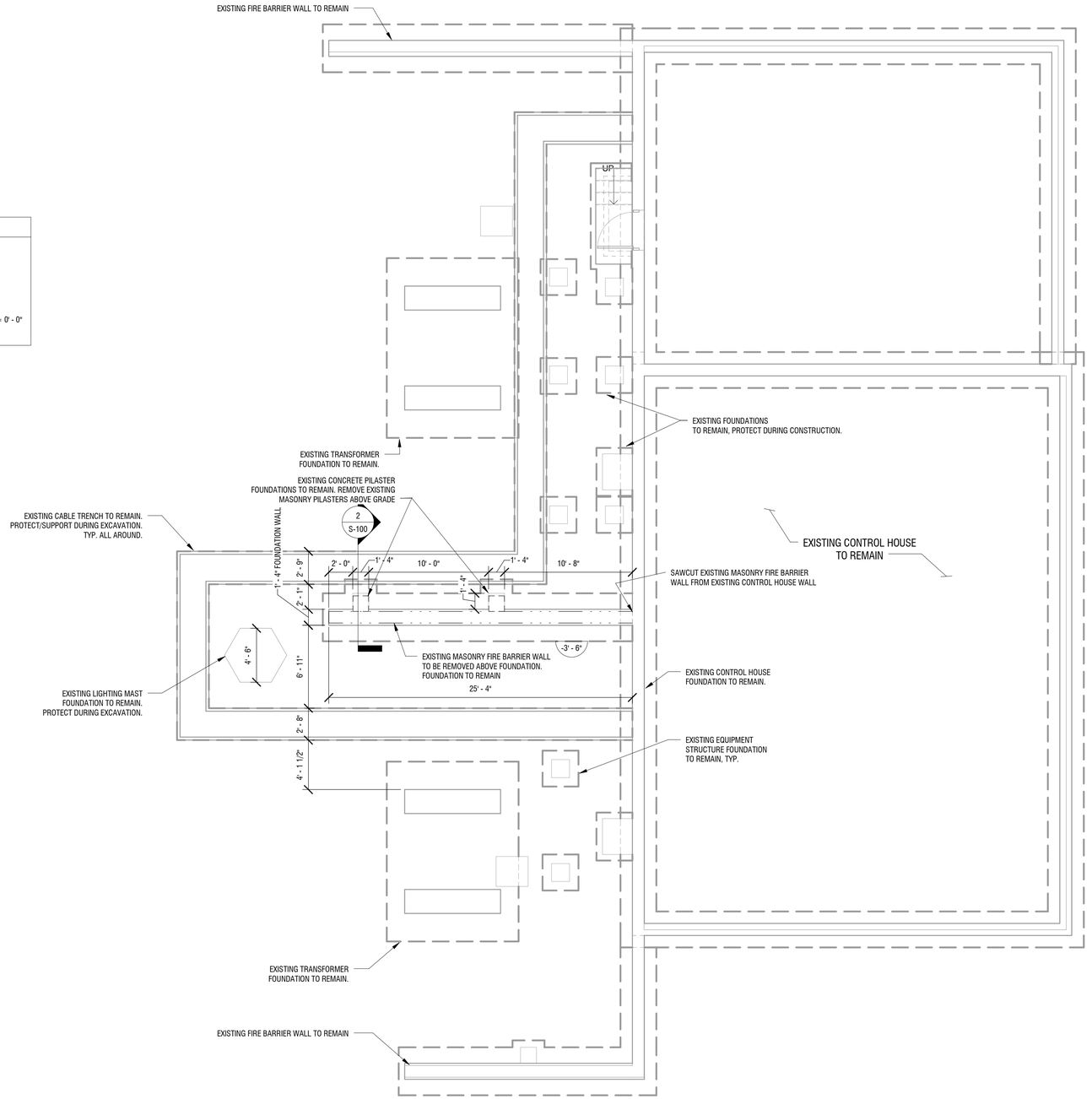
- TO BE DEMOLISHED
- EXISTING TO REMAIN
- -#' - #" — BOTTOM OF EXIST. FOOTING ELEV. W/ RESPECT TO GRADE ELEVATION = 0' - 0" TO BE VERIFIED IN FIELD.



2 S-100 EXISTING FIRE BARRIER WALL DEMOLITION SECTION

1/2" = 1'-0"

NOTE: SUBSTATION EQUIPMENT WILL BE LIVE DURING CONSTRUCTION. CONTRACTOR SHALL PROVIDE ADEQUATE PROTECTION TO LIVE PARTS AS REQUIRED.



1 S-100 SUBSTATION PARTIAL DEMOLITION FOUNDATION PLAN

3/16" = 1'-0"

DEMO PLAN NOTES:

1. BOTTOM OF FOOTING ELEVATIONS ARE REFERENCED FROM GRADE ELEVATION 208.0' (DATUM ELEV. 0' - 0") AND ARE NOTED ON PLAN.
2. VERIFY ALL EXISTING DIMENSIONS IN FIELD.
3. DO NOT SCALE DRAWINGS.
4. SECTIONS INDICATED ON PLAN ARE TYPICAL FOR SIMILAR CONDITIONS.

LABELLA
300 State Street | Engineering
Suite 201 | Architecture
Rochester, NY 14614 | Environmental
P: (585) 454-6110 | Planning

No	Date	Revision	By	Chkd.	Engr.	Supv.

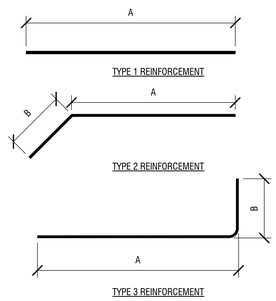
The United Illuminating Company

Drawn JTW	Date 05/09/17	Scale: As indicated	CAD FILE NAME S-100	SEQUENCE No. 099343	DRAWING NUMBER 55211-410B
Chkd. JRJ	Design Engr. JTW	Design Supv. JRJ			

PARTIAL DEMOLITION PLAN AND DEMO WALL SECTION

TRAP FALLS

FOUNDATION LEGEND		
1.	#'-#"	#'-#" - BOTTOM OF FOOTING ELEV. FOR WALL FOOTING W/ RESPECT TO DATUM ELEVATION = 0' - 0".
2.	[##'-##"]	TOP OF WALL ELEVATION



BAR SCHEDULE - TRAP FALLS						
MARK	NO.	TYPE	WEIGHT	A	B	COMMENTS
5B01	8	1	1.043 LB/FT	12'-6"		
5B02	8	1	1.043 LB/FT	12'-11"		
5B03	27	2	1.043 LB/FT	3'-0"	1'-0"	
6B01	80	1	1.502 LB/FT	19'-8"		
6B02	16	1	1.502 LB/FT	17'-0"		
6B03	27	3	1.502 LB/FT	4'-9"	0'-9"	

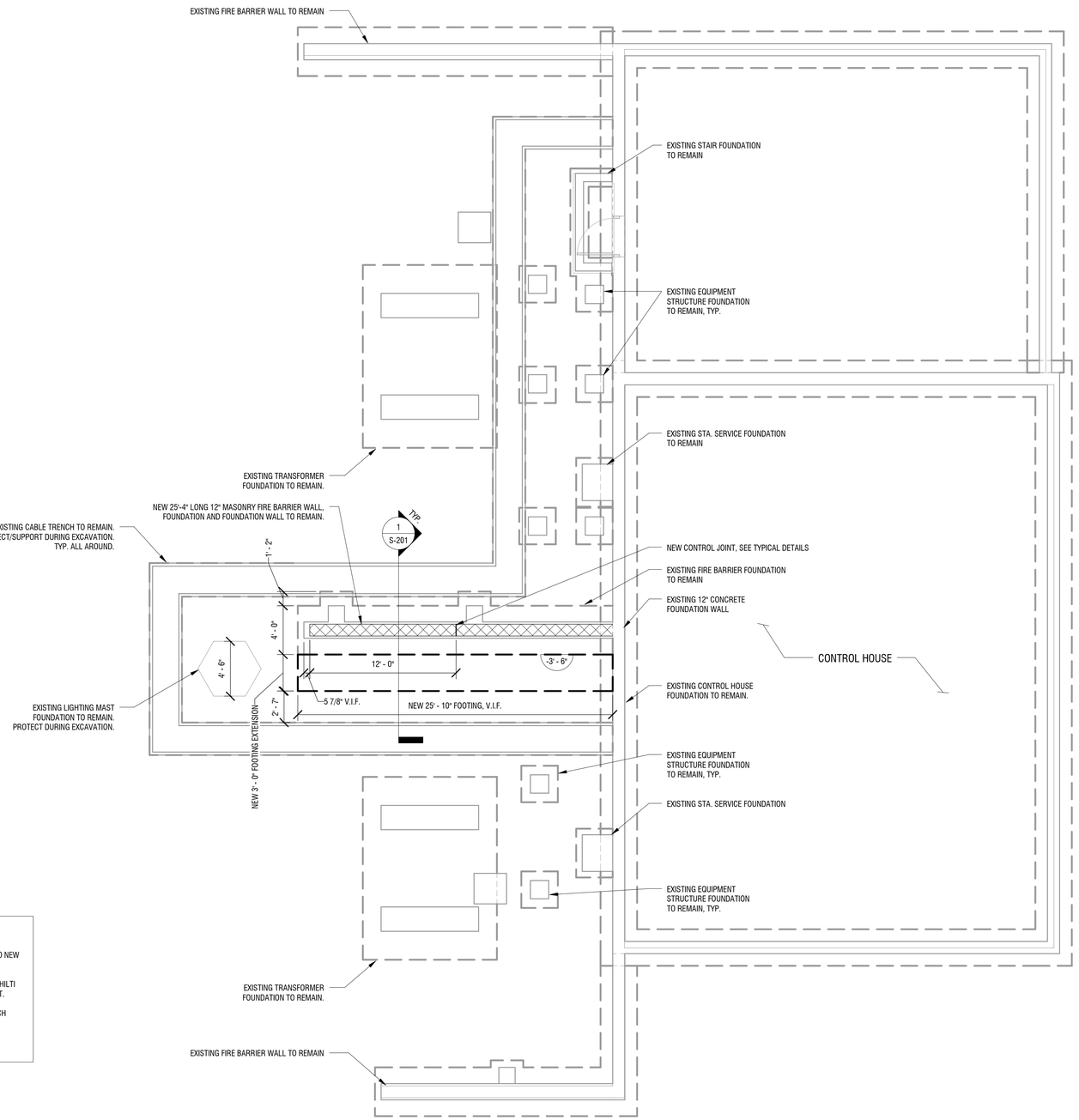
BILL OF MATERIALS SCHEDULE			
ITEM NO.	QUANTITY	UNITS	DESCRIPTION
1	500	SF	12" WIDE NORMAL CMU, FULLY GROUTED W/ WATERPROOFING SYSTEM
2	20	LF	PREFORMED GASKET
3	78	LF	BACKER ROD AND SEALANT
4	26	LF	COPING CAP ON MASONRY WALL
5	21	CY	EXCAVATION
6	5	CY	4,500 PSI CONCRETE FOUNDATION
7	2	CY	CRUSHED #2 STONE

EQUIPMENT MOUNTING NOTES:

1. CONTRACTOR SHALL COORDINATE WITH UI TO MOUNT THE FOLLOWING ELECTRICAL EQUIPMENT ON THE NEW MASONRY FIREWALL:
   - A. FOUR (4) NEW RAB LED FLOODLIGHTS (SUPPLIED BY OWNER).
     - I. MOUNT LED FLOODLIGHTS TO NEW HEAVY DUTY WEATHERPROOF JUNCTION BOX WITH 1/2" OUTLET. MOUNT JUNCTION BOX TO NEW MASONRY FIREWALL WITH MINIMUM 1/4" DIA. TAPCONS. COORDINATE WITH UI FOR JUNCTION BOX MAKE AND MODEL.
   - B. TWO (2) MOTION SENSORS AND WALL BRACKETS (SALVAGED AND PROVIDED BY OWNER)
     - I. MOUNT EXISTING WALL BRACKETS OF MOTION SENSORS TO NEW MASONRY FIREWALL WITH MINIMUM OF TWO (2) - 3/8" DIA. HILTI KWIK HUS-EZ SCREWS. MATCH EXISTING MOUNTING PATTERN. MODIFY SCREW DIAMETER BASED ON EXISTING WALL BRACKET.
   - C. CONTRACTOR SHALL MOUNT ONE (1) SUBSTATION JUNCTION BOX.
     - I. MOUNT JUNCTION BOX TO NEW MASONRY FIREWALL WITH MINIMUM OF FOUR (4) - 3/8" DIA. HILTI KWIK HUS-EZ SCREW. MATCH EXISTING MOUNTING PATTERN. MODIFY SCREW DIAMETER BASED ON EXISTING MOUNTING BRACKET.

PATTERN.

2. ATTACH CONDUIT TO WALL WITH CONDUIT STRAPS AND MINIMUM 1/4" DIA. TAPCON SCREWS.



1 S-101 SUBSTATION PARTIAL FOUNDATION PLAN - NEW

3/16" = 1'-0"

FOUNDATION PLAN NOTES:

1. BOTTOM OF FOOTING ELEVATIONS ARE REFERENCED FROM GRADE ELEVATION 208.0' (DATUM ELEV. 0' - 0") AND ARE NOTED ON PLAN.
2. DO NOT SCALE DRAWINGS.
3. SECTIONS INDICATED ON PLAN ARE TYPICAL FOR SIMILAR CONDITIONS.

LABELLA
300 State Street | Engineering
Suite 201 | Architecture
Rochester, NY 14614 | Environmental
P: (585) 454-6110 | Planning

No	Date	Revision	By	Chkd.	Engr.	Supv.

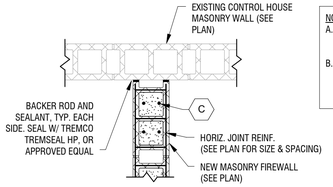
The United Illuminating Company

Drawn JTW	Date 05/09/17	Scale: As indicated	
Chkd. JRJ	Design Engr. JTW	Design Supv. JRJ	

PARTIAL FOUNDATION PLAN AND SCHEDULES

TRAP FALLS

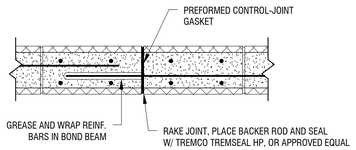
CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
S-101	099344	55211-410C



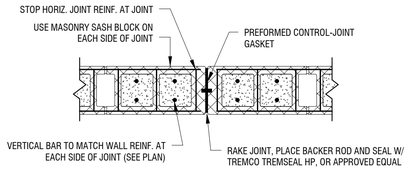
NOTES:
A. BALANCE OF VERTICAL WALL REINFORCEMENT NOT SHOWN FOR CLARITY. SEE MASONRY WALL SCHEDULE FOR SIZE AND SPACING.
B. ADDITIONAL VERTICAL BARS TO MATCH WALL REINFORCEMENT. RUN FULL HEIGHT OF WALL & DOWEL INTO FOUNDATION. ADDITIONAL BARS SHALL BE LOCATED WITHIN 8 INCHES OF CORNER OR WALL END.

6 S-201 FIRE BARRIER WALL TO CONTROL HOUSE WALL INTERSECTION DETAIL

3/4" = 1'-0"



TYPICAL PLAN AT BOND BEAM

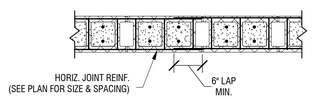


TYPICAL PLAN AT WALL

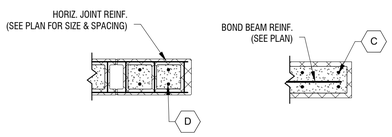
5 S-201 TYPICAL MASONRY WALL CONTROL JOINT DETAILS

1" = 1'-0"

NOTE: INSTALL (1) CONTROL JOINT AT CENTER OF NEW MASONRY WALL LENGTH.



HORIZONTAL JOINT REINF. LAP

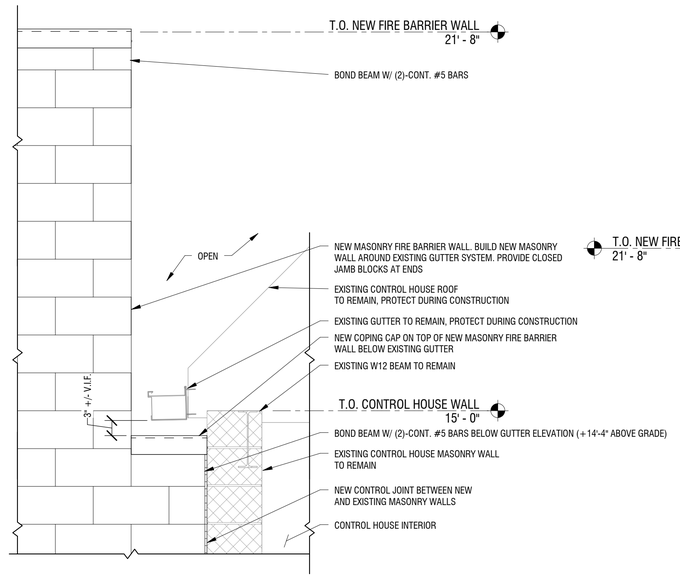


HORIZONTAL JOINT REINF. AT END **BOND BEAM REINF. AT END**

NOTES:
A. THESE DETAILS ARE FOR MASONRY WALLS SUPPORTED ON A CONTINUOUS FOUNDATION WALL OR FOOTING.
B. BALANCE OF VERTICAL WALL REINFORCEMENT NOT SHOWN FOR CLARITY. SEE MASONRY WALL SCHEDULE FOR SIZE AND SPACING.
C. ADDITIONAL VERTICAL BARS TO MATCH WALL REINFORCEMENT. RUN FULL HEIGHT OF WALL & DOWEL INTO FOUNDATION. ADDITIONAL BARS SHALL BE LOCATED WITHIN 8 INCHES OF CORNER OR WALL END.

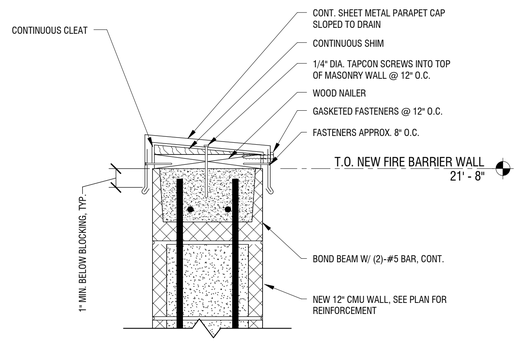
4 S-201 TYPICAL MASONRY WALL JOINT AND END

3/4" = 1'-0"



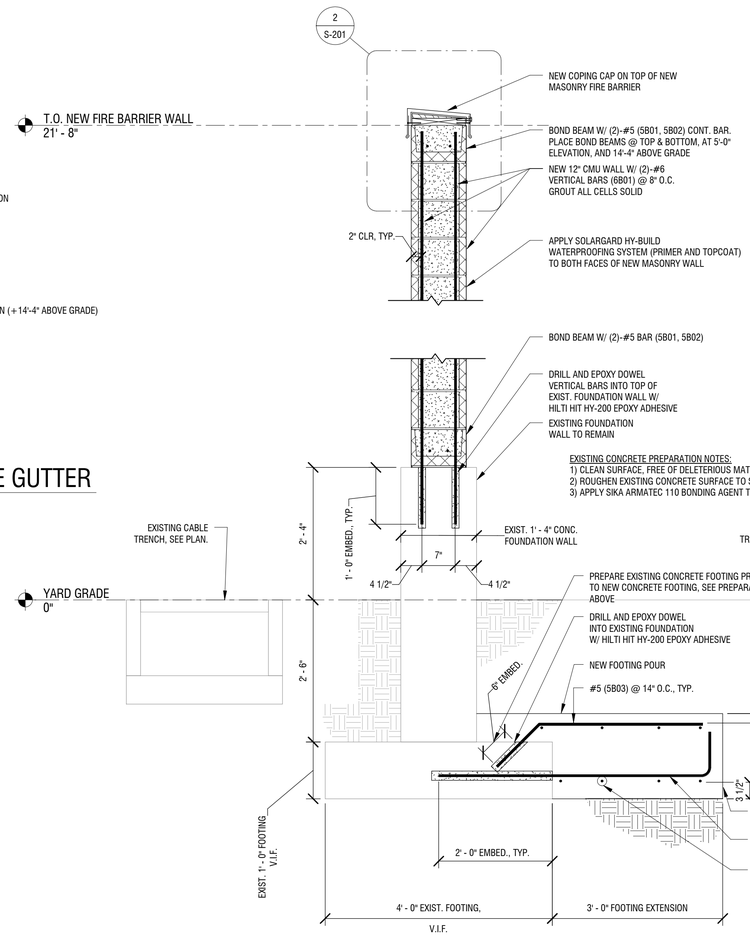
3 S-201 MASONRY WALL DETAIL - AT EXISTING CONTROL HOUSE GUTTER

3/4" = 1'-0"



2 S-201 FIRE BARRIER WALL CAP DETAIL

1 1/2" = 1'-0"



1 S-201 NEW FIRE BARRIER WALL SECTION

3/4" = 1'-0"

LABELLA
300 State Street | Engineering
Suite 201 | Architecture
Rochester, NY 14614 | Environmental
P: (585) 454-6110 | Planning

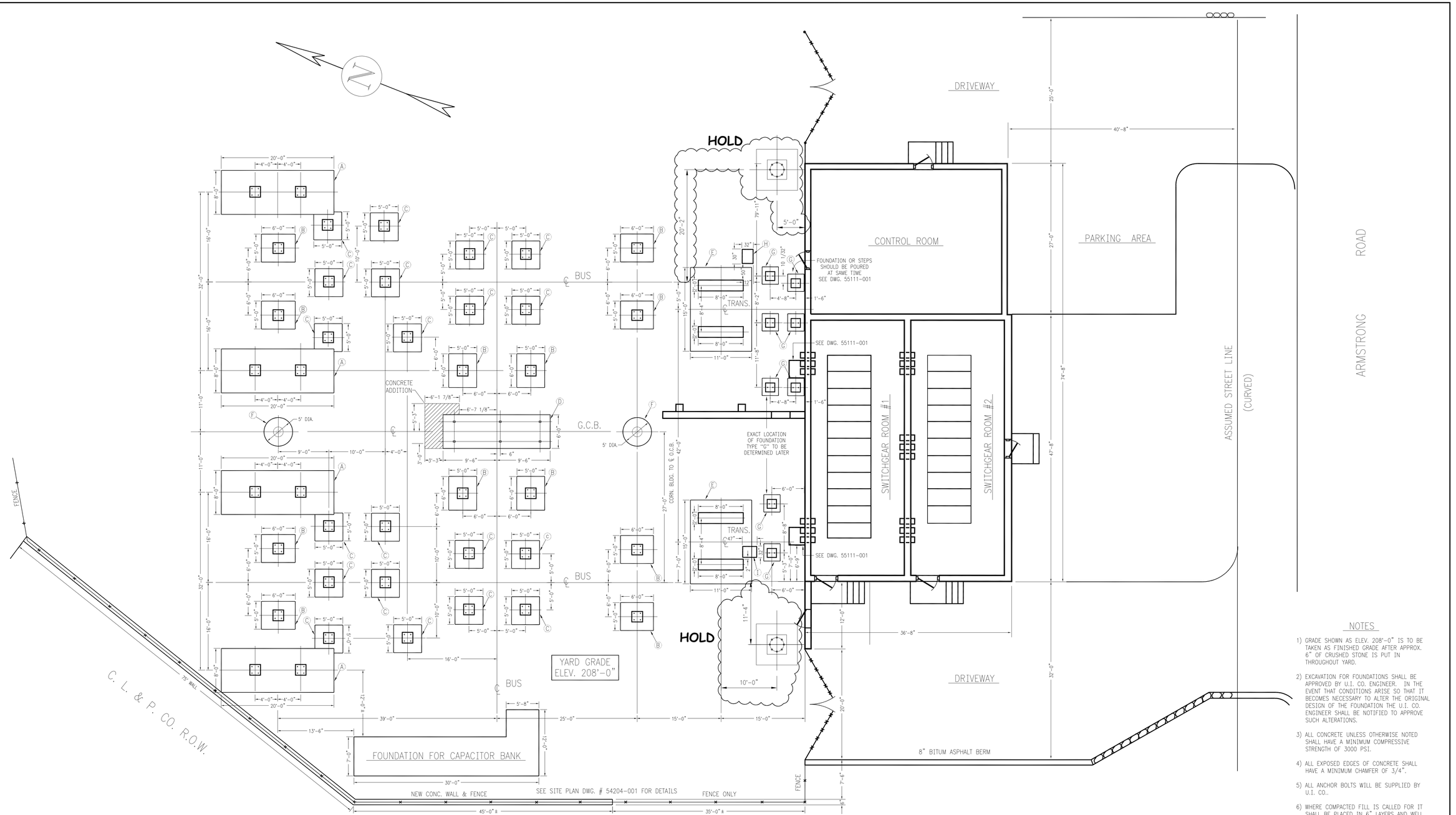
No	Date	Revision	By	Chkd.	Engr.	Supv.

The United Illuminating Company

Drawn JTW	Date 05/09/17	Scale: As indicated	CAD FILE NAME S-201	SEQUENCE No. 099497	DRAWING NUMBER 55211-410D
Chkd. JRJ	Design Engr. JTW	Design Supv. JRJ			

FIRE BARRIER WALL SECTION AND MASONRY DETAILS

TRAP FALLS



NOTES

1) GRADE SHOWN AS ELEV. 208'-0" IS TO BE TAKEN AS FINISHED GRADE AFTER APPROX. 6" OF CRUSHED STONE IS PUT IN THROUGHOUT YARD.

2) EXCAVATION FOR FOUNDATIONS SHALL BE APPROVED BY U.I. CO. ENGINEER. IN THE EVENT THAT CONDITIONS ARISE SO THAT IT BECOMES NECESSARY TO ALTER THE ORIGINAL DESIGN OF THE FOUNDATION THE U.I. CO. ENGINEER SHALL BE NOTIFIED TO APPROVE SUCH ALTERATIONS.

3) ALL CONCRETE UNLESS OTHERWISE NOTED SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.

4) ALL EXPOSED EDGES OF CONCRETE SHALL HAVE A MINIMUM CHAMFER OF 3/4".

5) ALL ANCHOR BOLTS WILL BE SUPPLIED BY U.I. CO..

6) WHERE COMPACTED FILL IS CALLED FOR IT SHALL BE PLACED IN 6" LAYERS AND WELL COMPACTED BY HAND OPERATED PNEUMATIC OR GASOLINE DRIVEN TAMPER.

7) FDR DETAILS OF CAPACITOR BANK FOUNDATIONS SEE U.I. DWG. # 55211-088

DOES NOT CONTAIN CRITICAL ENERGY INFRASTRUCTURE INFORMATION
DATE OF REVIEW 11/05/10 BY JLR

AREAS BACKCIRCLED ON THIS DRAWING INDICATE WORK ASSOCIATED WITH DESIGN ADEQUACY PROJECT #191369

THIS DWG. HAS BEEN REDRAWN FROM, AND REPLACES OLD U.I. DWG. # 54204-4 SHEET 1; DATE 03/31/69; REVISION # 3.

REFERENCE DRAWINGS

FOUNDATION DETAILS	54204-005
FOUNDATION DETAILS	54204-004A

BLACK & VEATCH Building a world of difference®

PROJECT NO. 191369

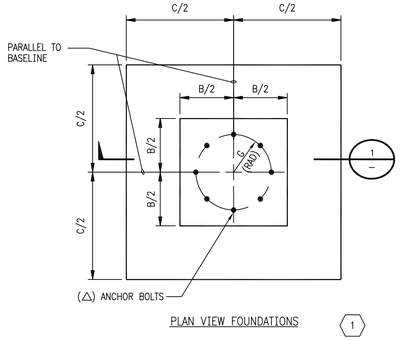
No	Date	Revision	By	Chkd.	Engr.	Supr.
B	11/23/2016	ISSUED FOR UI 90% REVIEW-PROJECT #191369-DESIGN ADEQUACY	CRE	MAR	CDS	WB
A	09/09/2016	ISSUED FOR UI 30% REVIEW-PROJECT #191369-DESIGN ADEQUACY	SLC	MAR	MI	WB
3	09/2016	DESIGN ADEQUACY PROJECT – TRAP FALLS	SLC	–	MI	WB
2	11/19/2012	CONFORMED TO CONSTRUCTION RECORDS – PROJECT 176046	BJF	JBS	GRV	ALL
1	12/04/94	NITROGEN SYSTEM FOUNDATION ADDITION	MEC	W.J.	J.M.	

United Illuminating
an investor-owned electric light and power company

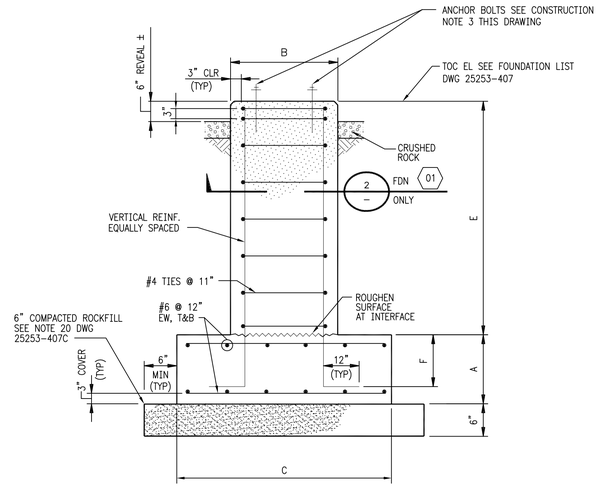
Drawn MEC	Date 11/30/94	Scale: 1/8"=1'-0"	
Chkd. W.J.	Design Engr. J.Z.	Design Supv.	

FOUNDATIONS PLAN
TRAP FALLS SUBSTATION

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
005313	005313	54204-004



PLAN VIEW FOUNDATIONS (1)



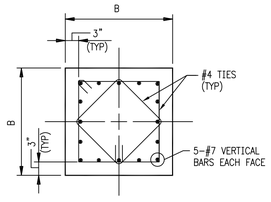
SECTIONAL ELEVATION

TYPE I SPREAD FOOTING FOUNDATION

SECTION 1

SEE SPREAD FOOTING FDN LIST THIS DWG

NOT TO SCALE



SECTION 2

NO SCALE

SEE THIS DWG

SPREAD FOOTING FOUNDATION LIST

FDN NUMBER ⬡	QTY OF FDN	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "E"	DIM "G"	VERTICAL REINF.	ANCHOR BOLT MK NO (SEE NOTES 3)	STRUCTURAL BOM ITEM NUMBER	FOUNDATION DESCRIPTION
1	2	1'-6"	3'-6"	8'-0"	–	3'-6"	LATER	16-#7	BY FAB	YS01	LIGHTNING MAST, 70 FOOT

HOLD: PENDING UNTIL ACTUAL LOADS ARE DETERMINED BY FABRICATOR.

NOTES

1. SEE DRAWING 15143-9A FOR GENERAL NOTES.
2. ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED AND INSTALLED BY GENERAL CONTRACTOR UNLESS NOTED OTHERWISE.
3. FOUNDATION ANCHOR BOLTS SHALL BE PROVIDED BY THE CONTRACTOR UNLESS NOTED OTHERWISE.
4. CONCRETE SHALL DEVELOP MINIMUM STRENGTH OF 4000 PSI AT 28 DAYS.
5. REINFORCING STEEL SHALL CONFIRM TO ASTM A615 GRADE 60.
6. SOIL UNDER FOOTINGS SHALL BE FIRM AND COMPACTED AS DIRECTED AND APPROVED BY U.I. CO. CONSTRUCTION SUPERVISOR, PRIOR TO POURING CONCRETE.

CONSTRUCTION NOTES

1. SEE DRAWING 54204-004 FOR GENERAL NOTES.
2. ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED AND INSTALLED BY THE GENERAL CONSTRUCTION CONTRACTOR, UNLESS NOTED OTHERWISE.
3. FOUNDATION ANCHOR BOLTS SHALL BE PROVIDED BY THE STRUCTURES & EQUIPMENT SUPPLIER, UNLESS NOTED OTHERWISE.

REFERENCE DRAWINGS

FOUNDATION AND PLAN LIST	54204-004

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

BLACK & VEATCH Building a world of difference®

DESIGNER	MI	DRAWN	CRE
CHECKED	–	DATE	–

PROJECT # 191369

NO	DATE	REVISION	DRN	CHKD	DESN	SUPR.
A	11/23/2016	ISSUED FOR UI 90% REVIEW-PROJECT 191369-DESIGN ADEQUACY	CRE	MAR	MI	WB

NEW DRAWING

No	Date	Revision	By	Chkd.	Engr.	Supv.
1	09/2016	DESIGN ADEQUACY	CRE	–	MI	WB

The United Illuminating Company

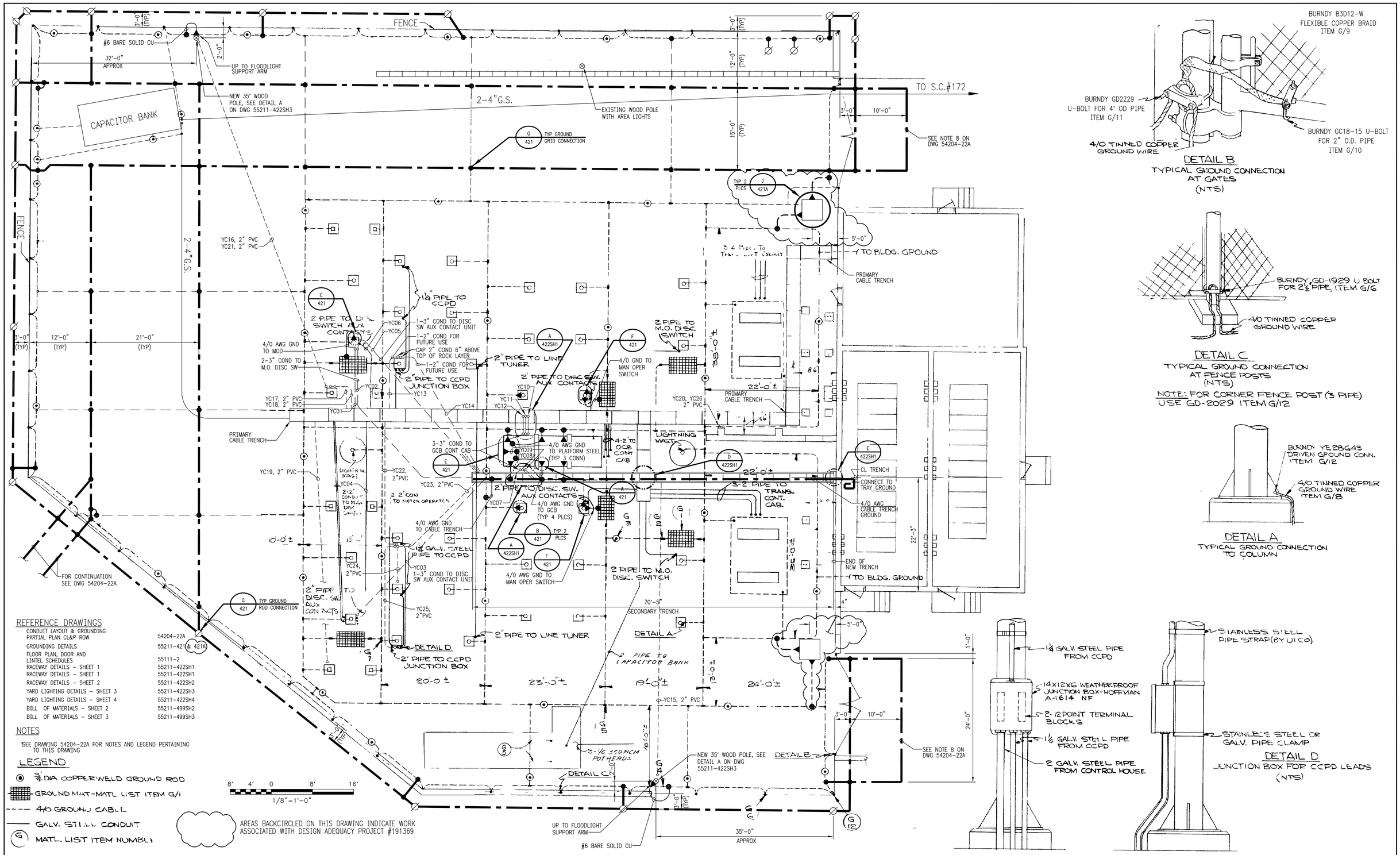
Drawn ____ Date 09/28/2016 Scale: NONE

Chkd. ____ Design Engr. ____ Design Supv. ____

FOUNDATION PLANS SECTIONS AND DETAILS

TRAP FALLS SUBSTATION

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
	098772	54204-004A



REFERENCE DRAWINGS

CONDUIT LAYOUT & GROUNDING PARTIAL PLAN CL&P ROW	54204-22A
GROUNDING DETAILS	55211-421 (& 421A)
FLOOR PLAN, DOOR AND LINTEL SCHEDULES	55111-2
RACEWAY DETAILS - SHEET 1	55211-422SH1
RACEWAY DETAILS - SHEET 1	55211-422SH1
RACEWAY DETAILS - SHEET 2	55211-422SH2
YARD LIGHTING DETAILS - SHEET 3	55211-422SH3
YARD LIGHTING DETAILS - SHEET 4	55211-422SH4
BILL OF MATERIALS - SHEET 2	55211-499SH2
BILL OF MATERIALS - SHEET 3	55211-499SH3

NOTES

SEE DRAWING 54204-22A FOR NOTES AND LEGEND PERTAINING TO THIS DRAWING

LEGEND

- ⅝" DIA COPPER-WELD GROUND ROD
- GROUND MAT-MATL LIST ITEM G/1
- 4/0 GROUND CABLE
- GALV. STEEL CONDUIT
- MATL. LIST ITEM NUMBER

AREAS BACKCIRCLED ON THIS DRAWING INDICATE WORK ASSOCIATED WITH DESIGN ADEQUACY PROJECT #191369

DETAIL B
TYPICAL GROUND CONNECTION AT GATES (NTS)

DETAIL C
TYPICAL GROUND CONNECTION AT FENCE POSTS (NTS)
NOTE: FOR CORNER FENCE POST (3 PIPE) USE GD-2029 ITEM G/12

DETAIL A
TYPICAL GROUND CONNECTION TO COLUMN

DETAIL D
JUNCTION BOX FOR CCPD LEADS (NTS)

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

DOES NOT CONTAIN CRITICAL ENERGY INFRASTRUCTURE INFORMATION
DATE OF REVIEW 8/20/2015 BY AJO

BLACK & VEATCH Building a world of difference®
PROJECT NO. 191369

No	Date	Revision	By	Chkd.	Engr.	Supr.
A	11/23/2016	ISSUED FOR UI 90% REVIEW-PROJECT #191369-DESIGN ADEQUACY	CRE	TD	CDS	WB

No	Date	Revision	By	Chkd.	Engr.	Supv.
9	10/2016	DESIGN ADEQUACY PROJECT - QUINNIPIAC	CRE	–	CDS	WB
8	08/20/2015	CONFORMED TO CONSTRUCTION RECORDS-PROJECT 187758-LINE TRAP REMOVAL	WDS	JDG	TKD	ALL
7	08/01/2013	COMPONENT UPGRADE	ADL	BLH	RSK	ALL
6	11/19/2012	CONFORMED TO CONSTRUCTION RECORDS - PROJECT 176046	BJF	JBS	GRV	ALL
5	8/11/00	ADDED CAPACITOR BANK	AL.G		H.W.L.	

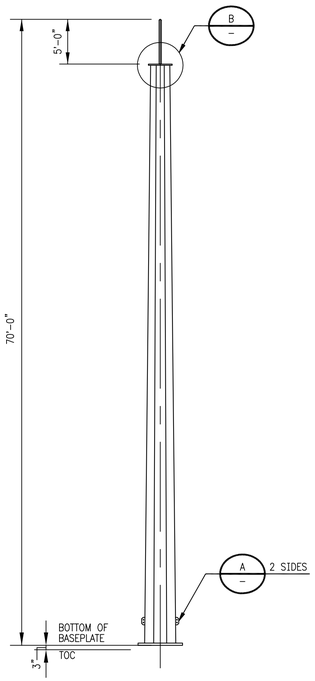
The United Illuminating Company

Drawn A.J. | Date 5/14/69 | Scale: 1/8"=1'-0"
Chkd. | Design Engr. J.J.Z. | Design Supv. D.V.

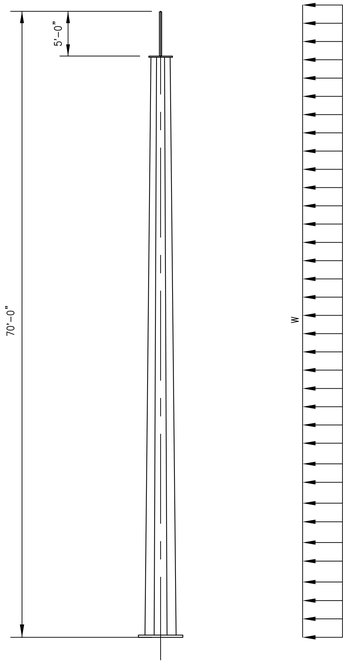
CONDUIT LAYOUT & GROUNDING DETAILS

TRAP FALLS SUBSTATION

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
05294	005294	54204-022

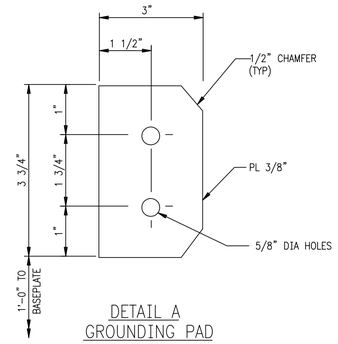


ELEVATION

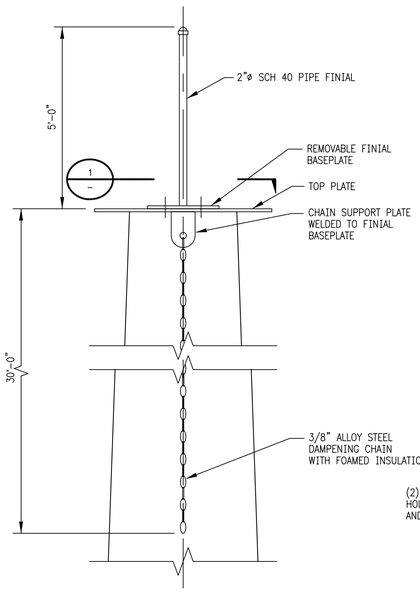


LOADING DIAGRAM

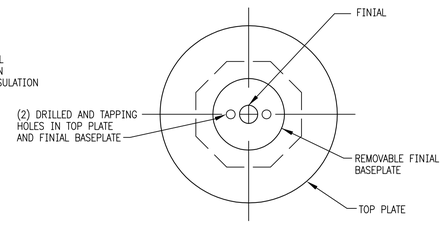
LIGHTNING MAST
STRUCTURE YS04
NO SCALE
(2 REQUIRED)



DETAIL A
GROUNDING PAD
NO SCALE



DETAIL B
NO SCALE
SEE THIS DWG



SECTION 1
NO SCALE
SEE THIS DWG

LOADING TABLE 1 (WITH OVERLOAD FACTORS)		
STRUCTURE	LOAD	LOAD CASE 1
LIGHTNING MAST (YS04)	W	0.045

LOADING TABLE 1 NOTES:

1. THE LOADS SHOWN IN LOADING TABLE 1 INCLUDE OVERLOAD FACTORS (OLF).
2. LOAD ABBREVIATIONS AND UNITS IN THE TABLE:
   "W" = WIND PRSSURE ON STRUCTURE AND EQUIPMENT (KIPS PER SQUARE FOOT)
3. LOAD CASES:
   LOAD CASE 1: EXTREME WIND
   LIGHTNING MAST WIND: 36 PSF
   WIND AND VERTICAL OLF: 1.25
4. THE WIND PRESSURE LOADS "W" SHALL BE APPLIED BY THE SUPPLIER TO THE STRUCTURE. THE PRESSURE DOES NOT INCLUDE A SHAPE FACTOR. THE SUPPLIER SHALL MULTIPLY THE WIND PRESSURE ON THE STRUCTURE BY THE APPROPRIATE SHAPE FACTORS SHOWN IN THE TABLE BELOW.
5. THE SUPPLIER SHALL INCLUDE THE STRUCTURE WEIGHT AND MULTIPLY THESE LOADS BY THE APPROPRIATE VERTICAL OVERLOAD FACTOR (OLF).
6. THE STRUCTURES SHALL MEET THE DEFLECTION CRITERIA UNDER "WORKING LOADS" AS DESCRIBED IN THE NOTES FOR LOADING TABLE 2.

STRUCTURE AND EQUIPMENT SHAPE FACTOR TABLE					
SHAPE	⟷	□	⬡	○ 12 OR MORE SIDES	⯃
SHAPE FACTOR	1.6	1.6	1.4	1.0	1.4

LOADING TABLE 2 (WORKING LOADS)		
STRUCTURE	LOAD	LOAD CASE 11
LIGHTNING MAST (YS04)	W	0.036

LOADING TABLE 2 NOTES:

1. THE LOADS SHOWN IN LOADING TABLE 2 ARE WORKING LOADS WITHOUT OVERLOAD FACTORS.
2. THE SUPPLIER SHALL PROVIDE GROUNDLINE REACTIONS FOR THE LOADING CONDITION SHOWN IN TABLE 2.
3. LOAD ABBREVIATIONS AND UNITS IN THE TABLE:
   "W" = WIND PRESSURE ON STRUCTURE AND EQUIPMENT (KIPS PER SQUARE FOOT)
4. LOAD CASES:
   LOAD CASE 2: EXTREME WIND
   LIGHTNING MAST WIND: 36 PSF
5. THE WIND PRESSURE LOADS "W" SHALL BE APPLIED BY THE SUPPLIER TO THE STRUCTURE. THE PRESSURE DOES NOT INCLUDE A SHAPE FACTOR. THE SUPPLIER SHALL MULTIPLY THE WIND PRESSURE ON THE STRUCTURE BY THE APPROPRIATE SHAPE FACTORS SHOWN IN THE TABLE BELOW.
6. THE SUPPLIER SHALL INCLUDE THE STRUCTURE WEIGHT.
7. THE STRUCTURE SHALL MEET THE FOLLOWING DEFLECTION CRITERIA UNDER WORKING LOADS AS DEFINED BY NEMA SG 6 FOR LOAD CASE 2:
   VERTICAL MEMBERS:
   HORIZONTAL DEFLECTION: HEIGHT/50

GENERAL DESIGN NOTES

1. THE MEMBER TYPES AND ORIENTATION SHOWN ARE FOR REPRESENTATION PURPOSES. THE STRUCTURES & EQUIPMENT SUPPLIER SHOULD DESIGN THIS STRUCTURE UTILIZING TUBES.
2. ANCHOR BOLTS SHALL BE DESIGNED AND SUPPLIED BY STRUCTURES & EQUIPMENT SUPPLIER, UNLESS NOTED OTHERWISE.
3. MAXIMUM ANCHOR BOLT CIRCLE SHALL NOT EXCEED 30 INCHES.
4. ALL STEEL IS HOT-DIP GALVANIZED. SHAPES AND PLATES ASTM A36 UNLESS NOTED OTHERWISE.
5. WELDING ELECTRODE GRADE 70.
6. ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED BY STRUCTURES & EQUIPMENT SUPPLIER AND ERECTED BY GENERAL CONSTRUCTION CONTRACTOR, UNLESS NOTED OTHERWISE.

REFERENCE DRAWINGS

FOUNDATION PLAN	54204-004
FOUNDATION PLAN, SECTION AND DETAILS	54204-004A

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

BLACK & VEATCH
Building a world of difference®

DESIGNER	MI	DRAWN	CRE
CHECKED	–	DATE	–

PROJECT # 191369

NO	DATE	REVISION	DRN	CHKD	DESN	SUPR.
A	11/23/2016	ISSUED FOR UI 90% REVIEW-PROJECT 191369-DESIGN ADEQUACY	CRE	MAR	MI	WB

NEW DRAWING

No	Date	Revision	By	Chkd.	Engr.	Supv.
1	10/2016	QUINNIPIAC DESIGN ADEQUACY	CRE	–	MI	WB

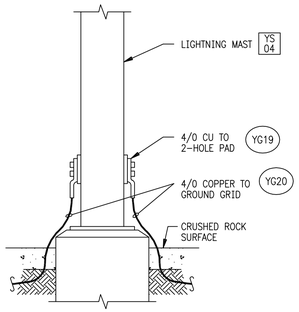
The United Illuminating Company

Drawn _____ Date 10/06/2016 Scale: NONE
Chkd. _____ Design Engr._____ Design Supv._____

70 FOOT LIGHTNING MAST
STRUCTURE YS04

TRAP FALLS SUBSTATION

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
	098789	55211-409A



DETAIL J
LIGHTNING MAST GROUNDING
NOT TO SCALE

REFERENCE DRAWINGS

CONDUIT LAYOUT & GROUNDING DETAILS	54204-22
BILL OF MATERAILS	55211-499SH1 & 499SH2

PRELIMINARY

NOT TO BE USED FOR CONSTRUCTION

BLACK & VEATCH
Building a world of difference®

DESIGNER	CDS	DRAWN	CRE
CHECKED	–	DATE	–

PROJECT # 191369

NO	DATE	REVISION	DRN	CHKD	DESN	SUPR.
A	11/23/2016	ISSUED FOR UI 90% REVIEW-PROJECT #191369-DESIGN ADEQUACY	CRE	TD	CDS	WB

NEW DRAWING

No	Date	Revision	By	Chkd.	Engr.	Supv.
1	10/2016	TRAP FALLS DESIGN ADEQUACY	CRE	–	CDS	WB

The United Illuminating Company

Drawn _____ Date 10/05/2016 Scale: NONE
Chkd. _____ Design Engr._____ Design Supv._____

GROUNDING DETAILS

TRAP FALLS SUBSTATION

CAD FILE NAME	SEQUENCE No.	DRAWING NUMBER
	–	55211-421A