PROPOSED HARTLEY ROAD ELECTRICAL SUBSTATION

Hartley Road and Cheechunk Road
Goshen, New York

FINAL ENVIRONMENTAL IMPACT STATEMENT

Volume II

May 01, 2012

Project Sponsor:

Orange & Rockland

Orange & Rockland Utilities, Inc.
390 West Route 59
Spring Valley, New York
(845) 577-3534

Prepared by:

KLEINFELDER
Bright People. Right Solutions.

1279 Route 300 2nd Floor
Newburgh, New York 12550
(845) 567-6530

HARTLEY ROAD FEIS

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APPENDIX A

Scoping Document and other SEQRA Documentation Correspondence

14-12-9 (3/99)-9c

SEQR

State Environmental Quality Review

Notice of Completion of Draft and Notice of SEQR Hearing

Lead Agency: Town of Goshen Planning Board

Project Number

Address: Town Hall - 41 Webster Avenue
Goshen, New York 10924

Date 12/30/11

This notice is issued pursuant to Part 617 of the implementing regulations pertaining to Article 8 (State Environmental Quality Review Act) of the Environmental Conservation Law. (and local law # Not Applicable if any)

A Draft Environmental Impact Statement has been completed and accepted for the proposed action described below. Comments are requested and will be accepted by the contact person until January 30, 2012 A public hearing on the Draft EIS will be held on 1/19/12 at 7:30 p.m. (date and time) at Town Hall, 41 Webster Avenue, Goshen, NY (place).

Name of Action:

Proposed Hartley Road Electrical Distribution Substation for Orange and Rockland Utilities, Inc.

Description of Action:

The Applicant, Orange & Rockland Utilities, Inc. proposes to build an electric distribution substation on property located within the Town of Goshen, as shown on the Tax Map thereof as Section 12, Block 1, Lot 1.7. Said property consists of approximately 48.7 acres and is located along Hartley Road in the Rural (RU) and Highway Commercial (HC) districts, and within the Scenic Road Corridor (SR) Overlay District. The application requires a special use permit from the Town Board and site plan approval from the Planning Board. This is an Unlisted action under SEQRA.

Location: (Include street address and the name of the municipality/county. A location map of appropriate scale is also recommended.)

The parcel involved has an address of 157 Cheechunk Road, and is located between Hartley Road and Cheechunk Road, in the Town of Goshen, Orange County, New York. It is shown on the Town Tax Map as Section 12, Block 1, Lot 1.7.

Potential Environmental Impacts:
Below are the areas that the Planning Board found the proposed project may have a potential environmental impact:
1- Land Use, Zoning and Public Policy
2- Visual Character
3- Vegetation and Wildlife
4- Wetlands and Surface Water Hydrology
5- Stormwater Management
6- Geology, Topography and Soils
7- Traffic and Transportation
8- Cultural Resources
9- The impact of Electromagnetic Fields
10- Noise
11- Fiscal and Socio-Economic Impacts
12- Impacts due to Construction of the Facility

A copy of the Draft / Final EIS may be obtained from:

Contact Person: Hon. Ralph Huddleston

Address: Town Hall, 41 Webster Avenue, Goshen, New York 10924

Telephone Number: (845) 294-6430

A copy of this notice must be sent to:

Department of Environmental Conservation, 625 Broadway Albany, New York 12233-1750

Chief Executive Officer, Town/City/Village of Goshen

Any person who has requested a copy of the Draft / Final EIS

Any other involved agencies

Environmental Notice Bulletin 625Broadway Albany, NY 12233-1750

Copies of the Draft EIS must be distributed according to 6NYCRR 617.12(b).

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Company DIVISION of ENVIRON PERMITS, Reg 3
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City ~~[illegible]~~ COHOES State NY ZIP ~~[illegible]~~ 12047
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Company
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APPENDIX A1

List of Public Comments

GARLING ASSOCIATES
COMMUNITY AND DEVELOPMENT PLANNERS

MEMORANDUM

TO: Town of Goshen Planning Board, Ralph Huddleston, Jr., Chairman
Neal Halloran, Town of Goshen Building Inspector
Sean Hoffman, P.E.
Richard Golden, Esq, and Kelly Naughton, Esq.

CC: Alan Lipman, Esq (for applicant)

FROM: Edwin Garling

RE: Orange & Rockland Utilities Echo Lake Substation at Hartley Road – Review of DEIS dated November 9, 2011

DATE: January 17, 2012

The Planning Board accepted the DEIS as complete for review by Interested and Involved Agencies on December 15, 2011 subject to minor modifications to be approved by the Town Planning Board attorney. Acceptance based on receipt of revised pages was December 30, 2011.

Our comments on the accepted DEIS are provided below:

1. (Page 12 of 88 - Section 2.3) Paragraph 2 discusses a proposed Orange County Government Center – where the current one is now partially closed. "Proposed Government Center" should probably read "potential or possible reconstruction or expansion of the County Government Center" as no new facility has been formally approved.
2. (Page 12 of 88 – Section 2.4) The two phases of construction are very clearly spelled out, but is there any delay or separation between the two phases, or any noticeable change relative to the flow of work?
3. (Page 22 of 28 – Section 3.1.2.2) The second paragraph of this section references the two area variances needed to keep the transmission connection lines out of the wetlands and above ground. The references to the variances should read "are requested and necessary", rather than "must be allowed."
4. (Page 29 of 99 – Section 3.2.3) It is noted, relative to the view depicted in figure 16, that the location of the photograph is not directly opposite Owens Road where cars would stop at the stop sign to turn left or right onto Cheechunk Road. That location would be where the proposed substation is most visible and it is screened to a greater degree than the offset view from figure 16. Cars stopped at the end of Owens Road would not have such a

direct view of the substation.

5. (page 76 of 88 – Section 4.11) Coordination with the Building Inspector and Town Highway Superintendent should be added to the list of mitigation measures relative to construction noise and dust and dirt on the adjacent Town roads.

6. We reviewed the DEIS and found it to be complete and well written with all uses fully addressed. However, when we looked at the alternatives, we question the location of Alternative Location No. 1 and wonder if that location could be adjusted to some degree. During the course of the review we would like the applicant to consider shifting the site southeast about 90 feet rather than the shift of approximately 300 feet that is shown in Alternative No. 1.

   A shift of between 80 to 100 feet to the southeast would do the following:

   a. The shift would remove the substation from the Scenic Road Corridor area which is legally or technically in the Scenic Road Corridor, though not actually in an area that impacts the corridor.
   b. The shift would eliminate impacts to the tree line to the west and shift the site farther from the Heritage Trail and houses across Cheechunk Road near Hartley Road.
   c. It would mean more grading, but would not likely mean blasting or locating the facility at a significantly higher elevation.
   d. The shift would eliminate any visibility from Owen or Cheechunk Road at the entrance.
   e. The shift would eliminate some tree clearance, and would result in a shorter access road to the proposed stormwater facilities.
   f. The shift could extend southeast just far enough to avoid getting into the tree line to the southeast and should have no impact on the wetlands or conservation area that has been proposed.
   g. We don’t believe the shifted site would be substantially higher than the currently proposed site location.

These are out initial comments on the DEIS and site plan for the Echo Lake Substation. Subsequent to the public hearing we will likely have additional comments relative to the public hearing comments and responses of the applicant to our comments.

GARLING ASSOCIATES
COMMUNITY AND DEVELOPMENT PLANNERS

MEMORANDUM

TO: Town of Goshen Town Board, Douglas Bloomfield, Supervisor
Town of Goshen Planning Board, Ralph Huddleston, Jr., Chairman
Neal Halloran, Town of Goshen Building Inspector
Sean Hoffman, P.E.
Richard Golden, Esq, Kelly Naughton, Esq., and Dennis Caplicki, Esq.

CC: Alan Lipman, Esq (for applicant)

FROM: Edwin Garling, AICP

RE: Orange & Rockland Utilities Hartley Road Substation at Hartley & Cheechunk Roads – Review of DEIS dated November 9, 2011 and Site Plans dated November 7 & 8, 2011; comments at Public Hearing of January 19, 2012

DATE: January 30, 2012 (*update to memo of January 17, 2012*)

The Planning Board accepted the DEIS as complete for review by Interested and Involved Agencies on December 15, 2011 subject to minor modifications to be approved by the Town Planning Board attorney. Acceptance based on receipt of revised pages was December 30, 2011. A joint public hearing (SEQRA and Site Plan) was held on January 19, 2012. The close of comment period is January 30, 2012.

Our comments on the accepted DEIS and site plan are provided below:

1. (Page 12 of 88 - Section 2.3) Paragraph 2 discusses a proposed Orange County Government Center – where the current one is now partially closed. "Proposed Government Center" should probably read "potential or possible reconstruction or expansion of the County Government Center" as no new facility has been formally approved. We understood the comment to mean that the new substation would be capable of providing electricity to a new or refurbished Government Center, regardless of size.

2. (Page 12 of 88 – Section 2.4) The two phases of construction are very clearly spelled out, but is there any delay or separation between the two phases, or any noticeable change relative to the flow of work?

3. (Page 22 of 88 – Section 3.1.2.2) The second paragraph of this section references the two area variances needed to keep the transmission connection lines out of the wetlands and above ground. The references to the variances should read "are requested and necessary", rather than "must be allowed."

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4. (Page 28 of 88 – Section 3.2.2) Paragraph three on this page describes the lighting, and notes that the luminaires would be dark sky compliant. Based on the plans and discussion at meetings, that appears to be the case. However, we would need to see more detail of the actual fixtures that will be set 14 feet above ground. The foot-candle isolines shown on figure 14 appear to show some fixtures at zero degrees and others at thirty degrees from vertical. This needs to be confirmed or clarified, in the interests of avoiding an undesirable lighting impact. Further specific clarification is required.
5. (Page 29 of 88 – Section 3.2.3) It is noted, relative to the view depicted in figure 16, that the location of the photograph is not directly opposite Owens Road where cars would stop at the stop sign to turn left or right onto Cheechunk Road. That location would be where the proposed substation is most visible and it is screened to a greater degree than the offset view from figure 16. Cars stopped at the end of Owens Road would not have such a direct view of the substation.
6. (page 76 of 88 – Section 4.11) Coordination with the Building Inspector and Town Highway Superintendent should be added to the list of mitigation measures relative to construction noise and dust and dirt on the adjacent Town roads.
7. We reviewed the DEIS and found it to be complete and well written with all uses fully addressed. However, when we looked at the alternatives, we wonder if the proposed or preferred site could be adjusted to some degree. During the course of the review we would like the applicant to consider shifting the preferred or proposed site southeast about 90 feet rather than the shift of approximately 300 feet that is shown in Alternative No. 1.

   A shift of between 80 to 100 feet to the southeast should do the following:

   a. The shift would remove the substation from some of the Scenic Road Corridor area which is legally or technically in the Scenic Road Corridor, though not actually in an area that impacts the corridor.
   b. The shift would eliminate impacts to the tree line to the west and shift the site farther from the Heritage Trail and houses across Cheechunk Road near Hartley Road and Owens Road. See also January 29, 2012 letter from Scott Thornton.
   c. It would mean more grading, but would not likely mean blasting or locating the facility at a significantly higher elevation.
   d. The shift would eliminate any visibility from Owen or Cheechunk Road at the entrance.
   e. The shift would eliminate some tree clearance, and would result in a shorter access road to the proposed stormwater facilities.
   f. The shift could extend southeast just far enough to avoid getting into the tree line to the southeast and should have no impact on the wetlands area that has been proposed.

g. We don't believe the shifted site would be substantially higher than the currently proposed site location.

8. A maintenance access road to the stormwater management facility goes through an existing opening in the wall. Could that access road run parallel to and alongside the northerly edge of the substation and cross the wall at the same point as the piping? This could create less disturbance to the area vegetation and site, and shift it farther from the wetlands.

9. Several plans show an area along Hartley Road and much of Cheechunk Road where there are two sets of dashed lines on the plans. We assume these are lot lines, but that is not clear. Is the area between these lines a portion of the roads that is intended to be offered for dedication to the Town for highway purposes? If so, it should be noted. If not, the lines must be explained.

10. Electric distribution lines are proposed to exit the site at the site's access driveway and run along the northwest edge of Owens Road to two utility poles. The lines would then appear to run up the poles to connect with the overhead lines. There are no photos, photo simulations or illustrations of what the appearance of these lines will be, if there are any boxes where the lines exit the ground, and there is no discussion of EMF impacts at these locations where they will be close to vehicles and potentially to pedestrians. These items need to be addressed in detail. See also January 29, 2012 letter from Scott Thornton.

11. Similar to comment 10, two sets of lines run underground along Cheechunk Road to Hartley Road. Along Cheechunk Road the lines run into boxes and then continue to boxes at Hartley Road at the west side of the road. What are the same details of the points where these lines exit the ground to go overhead?

To some degree comments 11 and 12 are similar to the question that Lee Burgess made at the public hearing.

12. The plans should show more room to park construction workers' vehicles on site. The construction area shown does not appear large enough to store equipment and material as well as to park both construction vehicles and workers' vehicles.

13. The density of the spruce and fir trees should be increased by moving them closer together from 15 feet to about 10 feet.

14. We note that the proposed site is situated so as not to be visible to most area homes and their residents except for 138 and 216 Cheechunk Road. In those residences, the taller substation structures will be visible from the second floor windows, and possibly those on the first floor. While most visual impact studies are tied to views from public roads or other specific public vantage points, an effort should be made to further screen the site from these locations. We did not believe, however, that the scenic road viewshed is affected by the proposed substation.

RIDDICK ASSOCIATES, P.C.

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NORMAN L. LINDSAY
DENNIS G. LINDSAY

SEAN T. HOFFMAN

M E M O R A N D U M

TO: Douglas Bloomfield, Supervisor & Town Board
Ralph Huddleston, Jr. Chairman & Planning Board

FROM: Dennis G. Lindsay, PE, Town Engineer, &
Sean T. Hoffman, PE, Planning Board Consultant

SUBJECT: Orange & Rockland Utilities, Inc. – Hartley Road Electrical Substation
Special Permit, Site Plan & Variance – **DEIS Review Comments/Public Hearing**
File No 12-1-1.7; Memo 83-12-001

DATE: January 13, 2012

CC's: Neal Halloran, Building Inspector, Broderick Knoell, Highway Superintendent,
Dennis Caplicki, Esq., Richard Golden, Esq., Ed Garling, AICP, Alan Lipman, Esq. (for Applicant)

* *

The following are our technical comments regarding the Draft Environmental Impact Statement (DEIS) and Site Plan for an unmanned electrical substation, overhead power lines, connections to an existing transmission main and associated site improvements on a 48.73 acre tract in the Rural (RU) and Commercial/Office (CO) districts with AQ6, Scenic Road Corridor and Floodplain & Ponding Area overlay zones having frontage on Cheechunk and Hartley Roads.

Background - The applicant made an initial presentation during the February 17, 2011 Planning Board meeting. At that time the Board assumed lead agency status, typed the action as unlisted and made a positive declaration on environmental impacts determining an Environmental Impact Statement (EIS) was necessary. The EIS scope was considered during the April 7, 2011 meeting and a public scoping session was held April 21, 2011. The EIS scope was revised and adopted during the May 5, 2011 Planning Board meeting. On December 15, 2011 the Planning Board accepted the Draft Environmental Impact Statement (DEIS) as adequate for public review and scheduled a public hearing for January 19, 2012.

SEQRA Process– We have reviewed the Draft Environmental Impact Statement (DEIS) for technical content. Review of this document, receipt of public comment on its content (public hearing and written comments), completion of an FEIS on substantive issues and adoption of findings are required to conclude SEQRA. To assist in your review, we have prepared the attached list of comments based on our review. We are distributing this in advance of the public hearing to give both Boards and the project sponsor an early opportunity to see our comments. We may wish to supplement these based on information you receive at the public hearing.

We have also commented on the site plan to the extent related to the environmental review. We anticipate further comment on plan details as the environmental review concludes and revised site plans are submitted incorporating your findings.

Special Permit – In accordance with the Town Code, public utilities, such as the proposed substation, require a special permit by the Town Board in addition to site plan approval by the Planning Board. As such, the January 19, 2012 meeting is a joint meeting to allow combined public hearings regarding the DEIS, site plan and special permit.

If you or the project sponsor requires any clarification on our comments, please advise.

Orange & Rockland Utilities – Hartley Road Electrical Substation – SEQRA
DEIS dated January 4, 2012

Introduction - The following comments are formatted to correspond with the structure of the DEIS. We believe this makes it easier to follow and for tracking responses in the FEIS. We have attempted to limit our comments to those of a substantive nature. In some instances we have noted inconsistencies. These are usually of small environmental consequence but are noted where they might lead to confusion or leave an unclear record of the underpinnings of the Board's ultimate findings.

Cover Sheet – The Cover Sheet includes a list identified as "other involved agencies" however we believe several of these agencies may be interested (rather than involved) agencies. We suggest revising the heading of this list to "Distribution List".

The dates of the preliminary DEIS submittal, acceptance, public hearing and close of public comment should be included.

Chapter 1 Executive Summary

Comment No.	Page/Fig.	Comment
1.1	3, Fig. 5 & Apx. B	DEIS discusses generally electrical distribution system improvements along Cheechunk, Owens, Echo Lake and Hartley Roads within the Town's right-of-way. Figure 5 shows underground electrical work along Echo Lake Road only. FEIS should clarify the description with figures for each road as well as plans showing limits and type of work (underground, overhead, structures) within Town's right-of-way.
1.2	4, Figs. 4 &6	DEIS states substation will be predominantly unlit. Figure 6 shows approximately 15 light fixtures throughout the substation site while Figure 14 shows light levels surrounding the security fence to be approximately 0.1 foot-candles. FEIS should address the potential for offsite glare, confirm the specified fixtures are dark sky friendly and indicate how lighting will be controlled (timer, photocell, motion detector or other).
1.3	5	DEIS states a Maintenance and Traffic Protection (MTP) Plan will be prepared to mitigate traffic impacts presumably associated with the electrical trenching work along Cheechunk, Owens, Echo Lake and Hartley Roads. Although the MTP should be prepared in conjunction with the distribution system improvement plans the FEIS should describe the anticipated measures (flaggers, detours, road plating, etc.) to mitigate the short-term impacts to traffic. FEIS should also confirm substation construction will be scheduled to avoid work zone conflicts associated with distribution system improvements. This may require multiple site access routes which would require restoration after the construction work.
1.4	7	FEIS should replace "lighten" with "reduce" when describing the impact on the existing electrical system.
1.5	7	DEIS indicates proposed project "provides the best alternative"; FEIS should indicate this is the project sponsor's opinion.

Chapter 2 – Description of Proposed Action		
Comment No.	**Page/Fig.**	**Comment**
2.1	7	The FEIS should indicate the Goshen Planning Board, as lead agency, classified the proposed action as an unlisted action on February 17, 2011 (prior to the adoption of the DEIS scope).
2.2	8 & Fig. 1	FEIS should indicate Cheechunk Road was formerly known as Strey Road and Owens Road was formerly known as Ingersol Road, as identified on the USGS Topographic Map used in Figure 1.
2.3	8 & Fig. 2	FEIS Figure 2 should identify the path of the existing overhead high voltage transmission lines as "ORU right-of-way".
2.4	10 & Fig. 6	DEIS indicates cameras will be installed around the fence for security. Figure 6 indicates infrared (IR) illuminator. FEIS should confirm the security cameras with the IR illuminators eliminate the need to routinely activate the site lighting during camera use.
2.5	12	DEIS states "South Goshen Substation…is expected to [reach] its normal rating by 2013"; FEIS should define "normal rating".
2.6	12	FEIS should confirm temporary sediment basin will be constructed in conjunction with the implementation of erosion and sediment control practices at the beginning of Phase 1, prior to tree clearing and grubbing.
2.7	Table 1	DEIS lists "Variances for Site Usage"; FEIS to confirm applicant is seeking an area variance for pole height.
Chapter 3 – Existing Conditions, Anticipated Impacts and Proposed Mitigation Measures		
3.1	10 &17	DEIS includes calculations of wetland disturbance associated with preferred option of an overhead transmission connection line and that if the applicant is unable to obtain the variance the underground connection would have a "greater disturbance". FEIS should quantify the disturbance associated with the potential underground connection so the environmental benefits may be evaluated.
3.2	18	DEIS indicates project is an industrial use; FEIS should indicate project is a public utility (not industrial use).
3.3	19 & Apx. L	DEIS indicates mitigation measures are unnecessary with respect to groundwater. This is at variance with the appended Spill Prevention, Control, & Countermeasure report. FEIS should discuss mitigation measures to reduce the potential for onsite oil to enter groundwater through the proposed stormwater pond and wetlands.
3.4	21	FEIS should clarify the Town's RU Zoning District is a Rural Zoning District (DEIS indicated Residential Zoning District).
3.5	21	FEIS should indicate applicant is seeking a variance for the overhead transmission connection (zoning code requires underground connection).

3.6	22	DEIS indicates variances for pole height and aboveground transmission connection must be *allowed*; FEIS should indicate variances must be *obtained*.
3.7	22	DEIS implies the requirement for underground lines is specific to the RU District. FEIS should clarify the requirement for underground lines (for which the applicant is seeking a variance for overhead lines) applies to all locations throughout the Town, regardless of zoning district.
3.8	28	DEIS indicates <u>14</u> total lights; FEIS should revise count to <u>15</u> lights to include the wall mounted fixture above the switchgear as shown in Figures 6 & 14.
3.9	28 Fig. 14	DEIS evaluates lighting impacts though a foot-candle analysis which is a measure of light intensity. FEIS should address the potential for glare and mitigations including shields, cut-offs, etc.
3.10	28	FEIS should discuss construction of earth berm during initial project phases to reduce visual impacts related to construction.
3.11	29	FEIS should include a detail or description of pull boxes, manholes and riser poles so impacts (if any) may be assessed.
3.12	29	DEIS describes the importance of existing vegetation to mitigate potential visual impacts; FEIS should confirm proposed limits of disturbance will be delineated (flagged) in the field prior to construction to reduce the potential for unintentional removal or damage to existing vegetation intended to remain.
3.13	30	DEIS indicates the restoration of Town roads disturbed by trenching for electrical distribution system improvements is seasonally dependent; FEIS should confirm trenching will be scheduled to avoid delays associated with seasonal asphalt availability.
3.14	30	FEIS to include pavement restoration detail(s) showing the width of restoration and trench composition. FEIS to identify potential impacts to existing Town drainage infrastructure (if any) and provide mitigations (rerouting or relocation of drainage culverts, bypass pumping of stormwater, etc.).
3.15	30	FEIS to indicate proposed underground facilities within the Town's right-of-way will be constructed within the road shoulder to the greatest extent practical to reduce impact to Town roads and traffic.
3.16	33 & Fig. 19	FEIS should clarify hatching (proposed bio-retention area appears to be wetland disturbance) and identify permanent wetland impact areas (hatching unsuitable for small scale figure); requirements to be noted in FEIS with details shown on site plan.

3.17	Fig. 25 & Apx. B	Figure appears at variance with full size plan; FEIS to confirm location of proposed snow storage area (indicated within area of no disturbance).
3.18	40 & Fig. 25	DEIS indicates unchecked runoff would negatively affect surface water quality. Figure 25 appears to show only a silt fence adjacent to the earth berm. FEIS should consider a small temporary basin or other sediment control measure to protect Wetland B.
3.19	41 Apx. K	DEIS states Wetland B will receive the same amount of runoff after construction; Appendix K shows an increase in the site curve number (pre-developed CN=78; post developed weighted CN=81.4) and presumably the post development runoff volume will exceed the predevelopment volume. FEIS should indicate no increase in stormwater runoff peak rates.
3.20	Fig. 24	Subareas 1C (2.9 ac) and 1B (0.98 ac) bypass the proposed stormwater pond and drain directly to Wetland B. Although some bypass is expected, Area 1C includes the snow storage area which may cause salt and silt laden snowmelt to enter the wetland without treatment. FEIS should evaluate the potential impact of this snowmelt entering the wetland and include mitigations (possibly relocation of snow storage area).
3.21	44	DEIS indicates thermal impacts (runoff) to be negligible. FEIS to discuss proposed pond landscaping as mitigation.
3.22	44	FEIS to replace “metered” outlet with “controlled” outlet.
3.23	45	FEIS to clarify the Town of Goshen is not an MS4 community and is not required to accept the SWPPP; Owner (applicant), Project Engineer and Contractor must certify SWPPP compliance as condition for permit coverage. Town Planning Board will review SWPPP for conformance with Town Code (local regulations) and general engineering practice.
3.24	52	DEIS references AASHTO Ex. 3-1; this is stopping sight distance (distance necessary for a vehicle to stop before reaching stationary object). This should be the AASHTO sight distance for a left (turn from stop turn west onto Cheechunk from driveway) or 390 feet for passenger cars. FEIS should evaluate and discuss mitigations.
3.25	54	DEIS indicates up to 25 workers onsite during construction; FEIS to indicate where worker parking and equipment storage is intended.
3.26	62	DEIS anticipates short-term noise impacts from construction operations. FEIS should consider installing berm during an earlier phase (after temporary sediment basin) to further mitigate short-term noise impacts.
3.27	Apx. B	Bulk Table included on plans should indicate required dimensional criteria in place of the drawing note.
Chapter 4 – Construction Impacts – No comments at this time.		
Chapter 5 – Alternatives to the Proposed Project– No comments at this time.		
Chapter 6 – Unavoidable Adverse Impacts– No comments at this time.		
Chapter 7 – Irreversible and Irretrievable Commitment of Resources– No comments at this time.		
Chapter 8 – Growth Inducing Impacts– No comments at this time.		

Chapter 9 – Limitations– No comments at this time.
Chapter 10 - References– No comments at this time.

Appendices		
	Apx. B	The plans should include a detail of the proposed grass swale including the swale geometry, seeding mixture, and any temporary stabilization measures to allow for the establishment of proposed grasses.
	Apx. B	The plans show several instances of dual subsurface stormwater drains penetrating a single end section. We believe the intention was to either install multiple adjacent end sections or construct large end sections configured to accommodate multiple drains.
	Apx. K	SWPPP signatures needed prior to submission of NOI (informational)
	Apx. B & K	SWPPP indicates the project is exempt from the DEC requirement for channel protection since the outlet orifice is less than 3” diameter. The plans indicate a 4” diameter orifice. FEIS to clarify and provide additional information regarding exemption.
	Apx. K	SWPPP NOI (No. 36) indicates no DEC permits are necessary. DEIS (page 2) indicates a DEC permit for Substation is necessary; FEIS to clarify.

RIDDICK ASSOCIATES, P.C.

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M E M O R A N D U M

TO: Douglas Bloomfield, Supervisor & Town Board
Ralph Huddleston, Jr. Chairman & Planning Board

FROM: Dennis G. Lindsay, PE, Town Engineer, &
Sean T. Hoffman, PE, Planning Board Consultant

SUBJECT: Orange & Rockland Utilities, Inc. – Hartley Road Electrical Substation
Special Permit, Site Plan & Variance – **DEIS Review – Supplemental Comments**
File No 12-1-1.7; Memo 83-12-003

DATE: January 30, 2012

CC's: Neal Halloran, Building Inspector, Broderick Knoell, Highway Superintendent,
Dennis Caplicki, Esq., Richard Golden, Esq., Ed Garling, AICP, Alan Lipman, Esq. (for Applicant)

* *

The following are supplemental technical comments regarding the Draft Environmental Impact Statement (DEIS) and Site Plan for an unmanned electrical substation, overhead power lines, connections to an existing transmission main and associated site improvements on a 48.73 acre tract in the Rural (RU) and Commercial/Office (CO) districts with AQ6, Scenic Road Corridor and Floodplain & Ponding Area overlay zones having frontage on Cheechunk and Hartley Roads.

Background – The public hearing for this application was held January 19, 2012. This was a joint meeting with the Town Board to obtain public comments regarding the DEIS, Site Plan and Special Permit. During the hearing, we provided a number of verbal comments supplementing those in our prior memorandum. The following are our supplemental comments based on matters we verbally discussed during the public hearing.

Supplemental Comments		
Comment	**Page/Fig.**	**Comment**
S1	5, 50, 52 &Fig. 27	DEIS calculates the importation of approximately 1,852 cubic yards (CY) of soil to the site requiring an estimating 93 truck loads (DEIS p. 52) and temporarily increasing traffic on local (Town) roads within the project vicinity for approximately two (2) weeks. FEIS should provide a Soil Movement Plan including a comparison of the calculated average gross truck weight to road restrictions with potential impacts and proposed mitigations. FEIS should also quantify the number of daily construction trips and deliveries along the anticipated route and address impacts to traffic and roads.
S2	Table 1, 17, 21, 22, 77 Fig. 34	DEIS indicates a portion of the site is within the Scenic Road Corridor and variances will be sought for pole height and aboveground electric lines. FEIS should address the potential visual and EMF impacts along with proposed mitigations specifically associated with the proposed above grade location of the connection line. FEIS should include an enlargement of Figure 34.
S3	43, 44, 47 Apx. L	DEIS states each proposed transformer contains 9,830 gallons of oil and spill countermeasures include sumps filled with an absorbent oil-stop polymer. FEIS should include additional information regarding the sump and polymer including a figure showing the location and construction of the sump and a narrative description of the polymer (historical uses, trade name(s), list of existing installations).

If you or the project sponsor requires any clarification on these, or our initial comments, please advise.

Edward A. Diana
County Executive

ORANGE COUNTY DEPARTMENT OF PLANNING

DAVID CHURCH, AICP
COMMISSIONER

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County Reply – Mandatory Review of Local Planning Action as per NYS General Municipal Law §239-l, m, &n

Local Referring Board: *Town of Goshen Planning Board* **County ID #:** *GOT01-12M*
Applicant: *Orange & Rockland Utilities* **Tax Map #:** *12-1-1.7*
Project Name: *Hartley & Cheechunk Roads Electrical Distribution Substation*
Proposed Action: *Draft Environmental Impact Statement*
Reason for County Review: *Located within 500' of Orange County Heritage Trail*
Comments:

The Department has received the above referenced Draft Environmental Impact Statement (DEIS) for Orange & Rockland Utility's proposed Hartley Road electrical distribution substation. The proposed project is in immediate proximity of the County's prominent Heritage Trail. As such, we have the following concerns:

- The proposed project – at 84 feet - will certainly be visible from the County's popular Heritage Trail, known for its recreational and scenic values. No amount of vegetation will be capable of masking this high tower. Artificial foliage would appear unnatural.
- The landscaping plan should exceed the note on drawing page 12, the Planting Plan. Here Note #5 states that plants shall be warranted for a period of two years. The County suggests this policy be upgraded to require the Utility -or future landowner- to replace any dead plant life within the season. Often applicants plant trees but fail to maintain them, especially in times of heat and drought. In order to minimize the visual impacts on the Orange County Heritage Trail and in this scenic corridor, it is essential current and new trees thrive.
- The Utility should also increase the caliper of deciduous trees to 3.5 – 4 inches as well as the height of evergreen trees to ten feet from 7-8 feet, as indicated on the Planting Plan. These larger trees are easily available and will provide better screening.
- Because the surrounding area will remain in its natural site, non-native trees are discouraged. The applicant should consider substituting a native species for the 23 Amur Privets planned as shown on the Planting Plan.
- This office questions why the Planting Plan indicates that two maple and two oak trees will be planted in areas clearly delineated as wetlands (lower left side).
- Figure 5 indicates a 4'-6' berm will be constructed to the east of the proposed entrance; however, a berm should also be constructed west of the entrance as well. This will minimize visual impacts in this part of the scenic corridor. Both berms should not be designed as mounds of linear dirt, but rather integrated into the landscape organically, as if there naturally. The east berm has ample land where a berm can meander between the road and substation.
- Mature trees should be planted around entire perimeter of property.
- The three trees that potentially host the endangered Indiana Bat should be protected, especially during construction.
- A wrought iron gate and fence rather than the chain link fencing material indicated on page 3 of the site plan is aesthetically more pleasing and also provides increased security since it is more difficult to climb.

Date: February 6, 2012
Prepared by: Kate Schmidt

David Church, AICP
Commissioner of Planning

Edward A. Diana
County Executive

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Report of Final Action by Local Board as per NYS General Municipal Law §239-l, m, &n

As stated in Section 239 of the General Municipal Law of the State of New York State, within thirty days of taking final action in regard to a required referral to the Orange County Planning Department, the local referring agency shall file a report as to the final action taken.

Local Board: Town of Goshen Planning Board **County Referral ID #: GOT01-12M**

Project Name: Hartley & Cheechunk Roads Electrical Distribution Substation

Date of Local Action:_____/_____/_______ **#Ayes:**________ **# Nays:**_________

In regard to the proposed action described above, the following final action was taken (*check one*):

_______ Our local board **approved** this action.

_______ Our local board **approved** this action **with modifications**. *Briefly describe the modifications below.*

_______ Our local board **disapproved** this action.

Reasons for acting contrary to County Planning Department's recommendation(s), if applicable:

Please return to: Orange County Dept. of Planning 124 Main St.Goshen, NY 10924
Questions or comments? Call: 845-615-3840

THORNTON SOONS, LLC.
41 Soons Circle
New Hampton, NY 10958
845.374.6704

January 29, 2012

VIA EMAIL & REGULAR MAIL

Hon. Ralph Huddleston, Chairman
Town of Goshen Planning Board
41 Webster Avenue
Goshen, New York 10924

Re: Orange & Rockland Utilities Hartley Road Substation DEIS

Dear Planning Board:

I write these comments on the Draft Environmental Impact Statement for Orange & Rockland Utilities' proposed Hartley Road Substation project on behalf of William and Jean Strong who reside on the historic "Strong" farm at 212 Cheechunk Road in the Town of Goshen - directly across the road from the project site.

1) The discussion of EMF impacts in the DEIS is flawed. The final scoping document for this project describes the extent of the EMF studies to be undertaken by the applicant in the DEIS. Under EMF analysis (Sec. 9, pp 11-12), the proposed scope states: "This section will discuss the proposed electromagnetic fields at the project site. The description will detail the EMF levels at varying locations at the Property Line for each alternative." However, the DEIS fails to undertake this analysis. The EMF discussion in the DEIS (Sec 3.9) and the study itself (DEIS Appendix O) only models the project built with the overhead connection lines - it does not model EMF levels for the "alternative" of buried connection lines. Given that fact that the applicant needs to obtain a variance to construct an overhead connection line for the project, this omission is startling. Clearly, the decision makers for this project should be provided with all the necessary information on environmental impacts before any decisions are made.[1]

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[1] Indeed, SEQRA regulations require that :"The lead agency will use the final written scope, if any, and the standards contained in this section to determine whether to accept the draft EIS as adequate with respect to its scope and content for the purpose of commencing public review. This determination must be made in accordance with the standards in this section within 45 days of receipt of the draft EIS.

1. (i) If the draft EIS is determined to be inadequate, the lead agency must identify in writing the deficiencies and provide this information to the project sponsor." 6 NYCRR Sec 617.0(a)(2). This calls into question whether the DEIS should have been submitted for public review at all given the EMF omissions.

Here, given the controversies surrounding EMFs and possible health risks, the applicant should study, as promised in the scoping document, whether burying the connection lines will lower EMF occurrence on the site. Only after a full EMF study, can any decision be made regarding this application and any variances it may need. Thus, we request a supplemental DEIS be produced containing the missing study promised in the scoping documents.

2) For reasons discussed above, the DEIS "Alternatives" discussion (DEIS Sec 5) is likewise flawed. Given the multitude of "construction" issues it raises in this discussion, it is clear that the applicant does not want to utilize buried connection lines. However, a viable "alternative" cannot be dismissed based upon crucial missing information. This section fails to analyze at all whether or not buried connection lines would lower EMF occurrence on-site - an issue raised repeatedly by the public as a major concern from this project (as this Board well knows). Given this record, the Board cannot possibly decide, as the law requires, "from among the reasonable alternatives available, the action is one that avoids or minimizes adverse environmental impacts to the maximum extent practicable, and that adverse environmental impacts will be avoided or minimized to the maximum extent practicable by incorporating as conditions to the decision those mitigative measures that were identified as practicable." 6 NYCRR Sec 617.11(d)(5) (emphasis added). Again, this "alternatives" section must be redone, once the necessary studies are complete.

3) The Noise impact analysis fails to adequately study impacts to the Strong property (DEIS Sec 3.10). There were no monitoring locations selected on the Strong property in the initial study, a curious omission given its proximity to the project (the Strong property is located between monitoring locations 3 and 4). Further, once the modeling identified specific noise impacts at locations immediately adjacent to the Strong farmhouse and their tenant house fronting on Owens Road (DEIS, Appendix P, Figure 18) no follow-up monitoring was undertaken. The "closest residence" shown in Table 5 of the Noise discussion is not the Strong residence - it is a property east of Owens Road. Thus, there was no study done to identify the increase in noise levels associated with the project at the "hotspots" shown by Figure 18. The NYDEC considers sound pressure increases of 5-10dB as "intrusive." Here, the applicant identifies the property east of Owens Road as likely having an increase of 3dB. Is the noise increase on the Strong property going to be 3 also - or maybe it is 4dB or even 5dB? Without adequate background sound level monitoring on the Strong property, the applicant is merely guessing. This Board should not subject the Strongs and their tenants to the constant droning of electrical transformers at possibly "intrusive" levels based on O&R's conjecture.

4) Finally, the applicant’s socio-economic analysis is deficient (DEIS Sec 3.11) because it utterly fails to examine the impacts of the proposed project on the prospective rental values of nearby homes, specifically the Strong tenant house fronting on Owens Road. This home seems to be the most directly impacted from the proposed project. From its widows, you will be able to look direct down the access drive to the substation, winter or summer (see DEIS Figures 12J, 12E). Also, this home has a noise impact of uncertain intrusiveness right up to its doorstep (see discussion above). Further, this home is the closest residence to possible EMF impacts according to the applicant (DEIS Figure 30). Yet, there is no mention at all of the economic impacts of this project on this home. The applicant’s economic analysis merely looks at comparable “sales” data from properties several miles away from other substations. This is not adequate under SEQRA. Certainly, economic impacts encompass the values of homes in measures apart from sales value. Here, you have the most severely impacted home only a few hundred feet from the project, and no analysis has been done assessing its future rental value. This is not an adequate socio-economic study under SEQRA.

Thank you for your anticipated consideration of these comments.

Respectfully yours,

Scott A. Thornton

cc: William & Jean Strong

Holly O'Hern
2 Summit View Drive
Goshen, New York 10924

Dear Mr. Eric Fuentes
Manager Public Affairs Orange and Rockland Utilities
390 W. Rte 59
Spring Valley, NY 10977

Re: OR Substation Hartley Road Goshen, NY

1/13/12

Dear Mr. Fuentes,

Thank you so much for calling me back, unfortunately it is very difficult for me to secure time during my working hours to call you back. Instead I am going to submit my idea to you via a letter.

As you are aware, many residents are opposed to the proposed O&R Substation on Hartley Road. The home owners near this site have made major investments in their homes and have paid the Town of Goshen thousands of dollars in taxes. Given the recession and this undesirable land usage, what will this do to their resale value? This will be seen as a visual blight and many fear and believe there are real health issues associated with the power lines which will run in front of their properties.

What if you could get your substation and the residents could salvage their homes? Recently Darlene Kerr had tried to place a mulching operation on her property which abuts the O&R property located on Hartley Road. This proposal was rejected by the Town of Goshen. Perhaps the Kerr's would sell this property to O&R, Section 12 Block 1 Lot 2.3. O&R could then place their substation deeper onto the Kerr property and utilize the property that you have already purchased as a buffer for the residents who live near this proposed site. The ingress and egress of the roadway could be changed to Hartley Road instead which would allow an additional buffer from the residential housing.

The residents of Goshen would appreciate it if you could look into this new idea and let us know if it could be possible. Let's try working together towards a solution we might all agree upon. I appreciate all your efforts and look forward to hearing from you at your earliest convenience regarding this very important issue before you.

Sincerely,

Holly O'Hern
Cc: Town Board of Goshen
Goshen Town Planning Board

Donna J. Allen
138 Cheechunk Road
Goshen, New York 10924

January 14, 2012

Members of the Town Board and Planning Board
TOWN OF GOSHEN
Goshen, New York 10924

RE: Orange and Rockland Substation
Located at Hartley and Cheechunk Roads

I apologize for not being able to attend the public hearing on January 19th 2012. However, I do request that the comments I am about to make become part of the public record.

After reviewing the Draft Environmental Impact Statement Volume I and Volume II, and the twelve site plans, I am still troubled with a few areas of concern.

First, 3.11.2 POTENTIAL IMPACTS found on page 67 of 88, dated December 20, 2011, "Orange and Rockland Utilities (ORU) contracted Valuation Consultants Incorporated (VCI) to review sales for residential properties close to other existing electrical substations in Orange County to measure potential impacts of substation on residential values….. Using these data, VCI concluded that no impact on property values is anticipated as a result of constructing the proposed Hartley Road electrical substation." **I believe the data used is outdated and not realistic.** I request that if it has not already been done, the board members should review Appendix Q Residential Property Valuation Report where you will see that the first property used was 55 Melody Lane, Harriman, NY. The date of sale was 8/12/05. If you look at the accompanying aerial photo you will see that the property is located down the block from the substation not directly across the street as I and some of my neighbors are. The second property used is 362 Old Tuxedo Road, Warwick NY. The date of sale was 9/11/02. This rear of this property abuts the substation however, there is an abundance of mature trees that act as a buffer. The third property used was 368 Old Tuxedo Road, Warwick, NY. The date of sale was 10/23/06. As with property two, the rear of the property is shielded from the view by numerous mature trees. I would like another analysis done with more recent sales with the houses situated similarly to how they are on Cheechunk Road. I would say to check properties that sold on Sugarloaf Mountain Road in Chester or near the Dunwoodie Substation in Yonkers, but you probably won't find too many that sold. Why?….. because no one wants to buy a house located across the street from an electrical substation. It was mentioned at previous meetings, **realistically speaking, a house located across from an electrical substation will be harder to sell, if it sells at all.**

Second, Risk of Fire or Explosion. Chairman Huddleston, in a letter I sent you dated, April 27, 2011, and verbally put forth to the Town Board at previous meetings, I noted that I did not see in the Scoping Document how a potential fire or explosion at the substation would be handled by the Town of Goshen Volunteer Fire Department. I asked that that question be answered. Instead, ORU, basically stated that potential risk of a fire or explosion is negligible because the facility is being monitored by the ORU control center. That's easy for them to say. They don't live across the street from it. The question was, and I repeat... **How will the Goshen Volunteer Fire Department extinguish a fire or respond to an explosion at the substation if it were to occur?**

Third, 3.3.3 PROPOSED MITIGATION, page 36 of 88, "ORU proposes to reduce potential impacts to vegetation and wildlife by minimizing natural habitat disturbance and tree clearing, and maintaining existing trees to the greatest extent practicable." I really hope that if this project goes through, ORU will hold true to its word in this case. The trees that are along Cheechunk Road, although not in the greatest shape, must remain. In the field study conducted by biologists from Kleinfelder, regarding bat habitats, p. 4 and 5 of 6, dated October 14, 2011, "Overall, the area provides poor to marginal bat roosting habitat as most trees do not exhibit exfoliating bark, and most of the snags are covered with poison ivy." Maybe ORU could get a tree specialist out there to cut/remove the poison ivy that is strangling many of those trees. The photos taken, see Figure 12C Summer View 3 and Figure 12H Winter View 3, are obviously taken at street level. My home is situated on higher ground. The view of the substation is going to be much more visible and obvious to myself and my family. If those trees are to die or be removed, the natural barrier (albeit not great, but better than nothing) will disappear. Back to page 36 of 88, ORU wants to "include a tree protection clause in the construction contract forbidding grading, filling, ditching, equipment parking, or material storage within the tree protection zone. Include penalties for violations of the tree protection clause and damage to trees." **Who enforces that?** Does someone watch everyday to make sure contractors are complying with the rules? Will ORU tell the people one thing than their contractors do something else? Remember what happened in Chester. It was a disgrace.

Lastly, Did ORU consider any other locations in the area where they could put the substation? I had suggested in the same letter to Chairman Huddleston, that an alternative location should be found that does not have a direct impact on homes in the area. I suggested the parcel of land that is located on 17M very close to the Department of Public Works building. It is owned by the County and the Village of Goshen. It is zoned commercial and is located near ORU's power lines. If the County were contacted perhaps they would consider a "land swap". I think it would have been worth a try so that the heartache that is going to be imposed upon the families that live in the effected, surrounding homes, could have possibly been avoided. **But that's just me...a tax payer.**

Sincerely,

Donna Allen

COPY

TOWN OF GOSHEN PLANNING BOARD
COUNTY OF ORANGE : STATE OF NEW YORK
---X
PUBLIC HEARING
ORANGE & ROCKLAND 12-1-1.7

---X

Thursday
January 19, 2012
Town Hall
41 Webster Avenue
Goshen, New York

PLANNING BOARD MEMBERS PRESENT:

Ralph Huddleston, Chairman
Reynell Andrews
Susan Cleaver
David Gawronski
John Lupinski
Lee Bergus
Giovanni Pirraglia

Neal Halloran, Building Inspector
Dennis Lindsay, PB Engineer
Ed Garling, PB Planner
Richard Golden, Esq. PB Attorney
Kelly Naughton, Esq. PB Attorney

ROCKLAND & ORANGE REPORTING
20 South Main Street
New City, New York 10956
(845) 634-4200

ALSO PRESENT:
TOWN BOARD OF THE TOWN OF GOSHEN
Douglas Bloomfield, Supervisor
Philip Canterino
Louis Cappella
Kenneth Newbold
George Lyons
Dennis Caplicki, Town Board Attorney

APPLICANT:
Alan S. Lipman, Attorney
John Coffey

(Orange & Rockland 1/19/12)

MR. HUDDLESTON: Next item under the agenda is public hearings, Orange and Rockland, 12-1-1.7 48.7 acres special use permit and site plan review located on Hartley Road in an RU and HC zone with AQ6, and scenic corridor overlay with Town Board.

MR. GOLDEN: This is a joint public hearing with the Town Board. The reason for that is that we are required to go ahead and try under SEQRA to coordinate, we're required to try to coordinate all the public hearings that are required in addition to the site plan that's required for this Board and the SEQRA, which we're also looking at, the Town Board is considering a special permit with respect to this. But the Planning Board is lead agency under SEQRA. Therefore, it's a joint public hearing for purposes of the special permit, the site plan and SEQRA.

And for this purpose the Town Board really should convene the opening of its meeting for purposes of the public hearing.

MR. LYONS: So moved.

MR. BLOOMFIELD: Is there a second?

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MR. NEWBOLD: Second.

MR. BLOOMFIELD: All in favor say Aye?

MR. NEWBOLD: Aye.

MR. LYONS: Aye.

MR. CAPPELLA: Aye.

MR. CANTERINO: Aye.

MR. BLOOMFIELD: Aye.

MR. GOLDEN: The Town Board is now convened for purposes of the joint public hearing with the Planning Board.

MR. HUDDLESTON: Okay, basically do you want to start, we need a little narrative how we got here?

MR. GOLDEN: Well, as I said it's a public hearing on the DEIS under SEQRA. This is the zoning as you had set forth, it does not require any new zoning whatsoever. It's a public utility facility and is allowed in all the zones but only by special permit of the Town Board and that's why the Town Board is involved in this particular one. They do need a ZBA variance before this is approved with respect to a height variance that they're asking for as well as a portion of

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the facility. They are asking for a variance not to have to go underground for a section of it. And so they are applying to the ZBA for those two variances.

And the SEQRA process generally with respect to this project as it is with all others at this stage is that we have a public hearing on the draft environmental impact statement. And then if the public hearing is closed tonight or if it's adjourned and closed at another night you will have public comments that can be accepted after the close of the public hearing for either 10 calendar days after the close of the public hearing or 30 days after the notice of completion. If it was closed tonight the notice of completion date is actually one day later and would be January 30th, but we will determine when you're finished with the public hearing tonight if it's closed actually by both you and by the Town Board, then we will set the specific date that public comments can, additional public comments that can be submitted in writing.

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And after that period the applicant is required to go ahead and submit a final environmental impact statement which must respond to all of the comments by the Board and the public that have been raised with respect to the draft environmental impact statement that has to be accepted by the Planning Board as lead agency. And the findings statement, the SEQRA findings statement has to be concluded after that and accepted by the Planning Board. And at that point in time is when SEQRA is finally completed and the various boards that can take an action are able to take an action. If it still needs the variances then the variances from the ZBA have to occur before the Town Board can act on the special permit or the Planning Board can act on the site plan. I think probably what makes sense is your traditional practice is simply having the applicant make a short presentation for the public hearing and then accept comments for the public.

MR. HUDDLESTON: Okay, and that's just

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what I would like to do. If you could give just a brief summation for the Boards and for the public as to what we're doing, where, why.

MR. LIPMAN: I'm going to address a different aspect of an introduction. My purpose tonight is to simply explain not for the benefit of the Board because I think you're aware of what the practice is with respect to hearings on a DEIS, and I'm sure the Town Board is familiar with it too. It is not our intention tonight to respond to comments or questions if they relate to the DEIS. It is not a matter of arrogance, we're not trying to avoid answering questions, but rather it isn't an appropriate thing to do tonight but rather to do so in writing as we prepare to respond to those issues for the final environmental impact statement. So we will not be responding to any questions relating to the draft environmental impact statement. Thank you.

MR. HUDDLESTON: That is our standard procedure as well by the way, the FEIS, that

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is actually the procedure of how it does, it does work.

I was looking for a brief discussion from somebody as to what is actually going on and we will give that to the public. Then we will take comments from the public, but the comments are addressed and answered in the final environmental impact statement. It does not occur that they sit here and try to answer all the questions and explain these things. They go back, they put together the formal answer, they put them in writing for our review, the public's review, everybody's review and they will be answered. So tonight they're going to give a brief presentation of what we're looking at. I'm going to ask our professionals as well to comment. There were some outstanding comments, they will need to be addressed, I'll have them discussed. The reason I go in that order again is so you have the benefit of hearing the professional's input first. I will ask the Board if they have any input, I will ask the Town Board if they have any input. And then

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I will come to you last. And it's not, I'm not coming to you last because of significance I'm coming to you last because that way you have heard everything supposedly that they have to say first before you form your statements and before we take them into the record. So that is how we will proceed. And if you'll introduce yourself and give us a brief summation of what's going on here I'd appreciate it.

MR. COFFEY: Good evening, my name is John Coffey, I'm the chief transmission and substation engineer for Orange & Rockland Utilities. To highlight the key points of the project this is basically an electrical infrastructure project for Orange & Rockland. It's really meant to increase the capacity and the reliability for the community of the Town of Goshen.

When we look at the system and we look at neighboring stations they basically reached capacity and this proposed station at the intersection of Hartley Road and Cheechunk Road is meant to increase the

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reliability and the capacity for the community.

When we look at the parcel of 49 acres we're looking to develop about 1 acre of the 49 acres, retain approximately 20 acres for a buffer around the development. And then we were looking to work with the Town as well as the Public Service Commission and a conservation easement on the remaining 29 acres of the parcel.

From the company's perspective this is an 18 million-dollar investment for the substation. Currently on the property that we've owned for sometime now we generate about $14,000 in taxes. After the proposed substation if it were to be installed it would generate over $500,000 worth of taxes. So again these are the key points for the station. We appreciate the opportunity to present this important project to the Board. Thank you again.

MR. HUDDLESTON: Okay, thank you. My typical procedure is to go engineer, planner, counsel. So first the engineers, please?

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MR. LINDSAY: We reviewed the DEIS document and we've prepared a memorandum that we've distributed to the Board. It goes through a number of points in here which we think should be clarified either because we think that there's missing information or perhaps it may not be as clear for the public's understanding and the Board's understanding of what they are proposing and what the mitigations are. I'm not going to go through all of that but I will highlight a couple of items there.

From an engineering perspective one of the things we're concerned about is the protection of your groundwater, your water supply, your surface waters. And this facility does store significant amount of oil in their transformers. We have made a comment on that. We asked them about that initially. They do have a plan for that. They have a spill prevention counter measure control plan included in the appendices here which is, they fall under certain regulations, the federal government as a

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facility and they're obligated to do that.

They have secondary containment and they have a number of mitigations for that but that's something that we're looking at, something that we've commented on and something that we'll be looking for some additional information from them.

Visibility is a key item here and they spent a lot of time in the document providing information on visibility analysis. I'll defer most of this to Ed, but I will say that they have proposed mitigations, they've got secruitis (phonetic spelling) road coming in, they've got berms and they've got plantings on those. We've made some comments and I think we'll make some further comments on that. One is maintenance of the landscaping to make sure that it thrives and we don't have problems in the future where some ice storm or something like that takes trees down and we don't have something there that's intended as a shield if you will.

There is some trucking involved here. In terms of they're moving I think it was

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6,000 cubic yards or so on the site but in total they need something in the order of 9,000 cubic yards. And the difference, I didn't get exact numbers, but the difference was around 1,800 cubic yards that they'll be importing. We'll be looking for some additional details on that to make sure that it works in concert with your traffic plans here and doesn't create a problem for you.

We've made a number of other comments in here which are for your consideration and for the FEIS that they'll prepare. I can go into further details on items for you if you wish, but I think that the primary purpose of tonight is to hear from the public and get their comments.

MR. HUDDLESTON: I agree. And basically most of the comments look to be a lot of housekeeping little cleanup additional details. I don't see any earth-shattering issues that I think are of major concern. I think most of them are cleanup. So I would, I would move on to the planner. And if clarification comes up during, that's

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necessary during the public comment and you feel there's something to say please jump back in if you think you can add to the effort. Mr. Planner?

MR. GARLING: Thank you, Mr. Chairman. We had a few minor comments and we won't get involved in those because they're not of great interest to the public. Comment three states that the variances that are required for this particular site are required, necessary. We believe it should say are required and necessary for this site to be developed rather than must be allowed. Indeed they must be allowed if this site is going to go through, but essentially they are requested and they are needed for this site.

It's noted that relative to the view depicted in figure 16 that the location of the photograph is not directly opposite Owens Road where cars would stop to turn left or right and look into the site. The location would be where the proposed substation is most visible and is screened to a greater degree than offset view from page 16. Cars

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stopped at the end of Owens Road would not have that particular view. So the view that is shown would be only visible to somebody who would be either going by in a car on Cheechunk Road for a second or two or somebody standing looking in, and not from a car stopped at Owens Road waiting to make a left or right turn. So it wouldn't be all that visible.

Coordination with the building inspector and highway superintendent should be added to the list of mitigation measures relative to the construction noise and dust and dirt on the adjacent town roads. We looked at the DEIS and looked at the alternatives. Alternative one the applicant had indeed pushed the site to a position where it would be difficult to develop it. We had suggested, and are suggesting, possibly looking at just a shift of about 80 to 100 feet to the southeast because that type of shift would remove the station from some more of the scenic road corridor area which is legally or technically in the scenic

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road corridor, although not actually in the area that impacts the corridor.

When reading the comprehensive plan the report that determined where the scenic road corridor should be the purpose of that scenic road corridor is views alongside the road and to the north where the views are. So this area, although it's in the corridor because there is a large radius around the edge of it, wouldn't impact that particular corridor all that much. The shift would also eliminate impacts to the tree line to the west and shift it slightly father from Heritage Trail and the houses across Cheechunk Road near Hartley Road. It would mean more grading, but would not likely mean blasting or locating the facility at a slightly higher elevation. The shift would eliminate any visibility from Owens or Cheechunk Road at the entrance because a greater angle with the road would be possible. The shift could also extend just far south enough to avoid getting into the tree line to the southeast, it should have no

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impact on the wetlands which was a concern of alternate one. And we don't believe this shift in site would be substantially higher grades.

We also had some other notes that we will, we will be getting into further comments once the public hearing is over and we have heard the public comments, and we can evaluate some of those and add to our comments during that time period between the close of the hearing and the end of the comment period.

We also took a look at the plans and felt that the, some of the trees that are shown on the berm could be a little closer together. We'll specify that at a later time.

There was comment made by the engineers about the room for parking vehicles. We noted that there is a clearance area where equipment would be placed on site ready for construction. It didn't seem to us though that there would be room enough there both for equipment that they would need to

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construct the site as well as parking for maybe 20 to 25 cars for the employees who would be working.

Those are our comments. As I said we will have additional comments at the end of the public hearing.

MR. HUDDLESTON: Okay, thank you. Counsel?

MR. GOLDEN: The only comments I have at this time, the Planning Board did receive two letters recently, one by Holly O'Hearn dated January 13th, 2012 and the other by Donna Allen dated January 14th, 2012. And both of those letters will need to be responded to by the applicant in the FEIS. I have copies here for the applicant of both of those.

MR. HUDDLESTON: All right, comments from the Board?

MS. CLEAVER: I have one, I'm having a hard time locating figure six.

MR. HUDDLESTON: I'm sorry?

MS. CLEAVER: I'm having a hard time locating figure six, I'm sorry. I didn't

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notice if the Board is missing figure six, the lighting.
MR. GOLDEN: Dennis has it over here.
MR. HUDDLESTON: The comments go 1, 2, 3, 4, 5, 7, 8.
MR. LINDSAY: Something must have happened to yours. We got the only good one, I don't know.
MR. GOLDEN: Dennis will have it copied and circulated.
MS. CLEAVER: That would be great, sorry.
MR. GOLDEN: We'll make sure that whatever copy is available to the public in the file will have that as well.
MS. CLEAVER: Okay.
MR. HUDDLESTON: So that copy of six will be made and placed in the public's copy as well as the Board's copy.
Any other comments or statements?
MR. GAWRONSKI: More of a question with counsel, will this require a waiver or a variance in regard to the scenic overlay?
MR. HUDDLESTON: Repeat the question,

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since it wasn't on the microphone?

MR. GOLDEN: The question was whether or not this would require a waiver of the scenic road corridor overlay and no it doesn't require a waiver.

MR. GAWRONSKI: Okay.

MR. GOLDEN: I mean there are requirements of the scenic road corridor regulations that the Board has to take into consideration with respect to this project because a portion of it is in the corridor. But to the extent that it needs a waiver from that, no.

MR. GAWRONSKI: I didn't know if any of the, you know, the position of anything will require it.

MR. GOLDEN: To my knowledge it does not. I'll take another look at that. The waiver, variance that it does need are the ones that are identified are going to be before the ZBA.

MR. HUDDLESTON: Okay. Other comments?

MR. BERGUS: Just a couple. I do have

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some comments on the formatting of the report. A couple corrections on that but that will be provided to the building inspector after the close of the public hearing.

One comment I do have though, now I'm not clear on the magnetic field strength. If the variance is not approved for the overhead wiring, the field strengths would be on site if they have to be buried lines. We are looking at the boundary, from what I take from it presuming the lines are overhead and we're looking at the distance from there, but if the lines are actually buried, trenched, what would the field strengths be on site and at the boundary?

MR. HUDDLESTON: Okay, other comments? If there are none I'm going to go to the Town Board and see if they have any comments at this point in time.

Supervisor Bloomfield?

MR. BLOOMFIELD: Yes, I have a question for Dennis. You were talking about 1,800 cubic yards of fill that would need to

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be brought to the site, is that correct?

MR. LINDSAY: Yes.

MR. BLOOMFIELD: I think that special emphasis needs to be put on how to get it there. We've had problems in the Town of Goshen in the past, like for example when they were building the sewer plant and they had to relocate a landfill particularly based on the weight tonnage on these roads, et cetera so I would just like to highlight that.

MR. LINDSAY: Very good.

MR. LYONS: Two things I wanted to, first I guess this is more of a comment than anything else, I just want to make sure that if in fact we close the meeting tonight for the special use permit is there any other administrative or SEQRA things that we have to do before we close the Town Board meeting? Is that Dennis?

MR. GOLDEN: I can respond to that. The Planning Board is the lead agency, so they have all of the requirements in that regard and the Town Board does not. And the

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Town Board cannot act as you know until the SEQRA process is completed. And in this case it would mean the adoption of the findings at the end after the FEIS. So if the public hearing is closed tonight then you would simply have to wait until the SEQRA is completed and you would also have to wait if it needed a variance from the ZBA. If the project is going as it is planned right now it also needs these two variances. So you could not act for a special permit until those variances are granted or they readjusted their plan so as not to require the variances.

MR. LYONS: And my last comment is another thing we have to do with the Town Board is accept a conservation easement, I'd like a copy of, the Town Board would like a copy of the proposed conversation easement, so we can review it. I didn't see it in the packet.

MR. GOLDEN: Okay, we'll get that to you. The Planning Board has a standard conservation easement that it usually uses

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with respect to projects. Sometimes it's modified one way or the other and that's clearly something that the Town Board ought to be looking at. So we'll provide that to you.

MR. HUDDLESTON: Okay? All right, thank you. Any other from the Town Board?

Counsel?

MR. CAPLICKI: Again, I don't know what the intention of the Board is, obviously we'll find out later this evening but if the Planning Board should close its public hearing it's the intention of the Town to follow suit either open or closed accordingly, just so the Board is aware.

MR. HUDDLESTON: Thank you. Well let's see, professionals, board, board, I guess we're to the fun part now. I would ask, before I open it to the public, I've had very good luck with public hearings in my 13 years I guess as chairperson here but I always throw this out, one thing I would ask you to do is to not talk over one another, okay? That, just besides being rude, it

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causes real difficulty with our stenographers and our recordings. I would also point out to you that sometimes issues are emotional, most times they aren't but if there are some emotions, emotions are not recorded. We are taking a record here of just comments. All we need is the facts. And being emotional, if you can avoid it, it just serves everybody for moving it along quicker because emotions are not recorded. We don't say hotly denoted or anything like that. So I mean we're just looking for, looking for the request of what you would like to see addressed. We and our professionals and both Boards will see that they are addressed. It's our job to see that it's addressed thoroughly and to the satisfaction of the Board completely.

MR. GOLDEN: Also if they can state the names in the FEIS we can reference it.

MR. HUDDLESTON: I also need you to, Neal is going to bring you a microphone, all right, I will point to whoever and forgive me for pointing but that's the only way I know to do it. I'll point to whoever. Just

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please raise your hand if you want to speak. Neal will bring you a microphone. The first thing I need you to do is clearly state your name and address, again for the record, okay so we have a clear vision of who you are and where you're from, okay?

So I'm going to open it now to the public. Who would like to go first?

MR. LAI: Good evening, my name is Peter Lai, I live on Cheechunk Road, Goshen, 127. The site we are talking about is everything I breathe, breathe air, walk over there. And I do know this will have, create some income tax for our town, for our community, whatever but I think a human side is what my concern is.

I was told I, my background is soil, I'm in soil science, starting in Master's degree in Mississippi State University. I have a trip in Oregon to see a study conducted by Oregon State University talking about the electrical magnetic field do have impact to human, to animal, to plants. In Cheechunk Road within half a mile there are

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already five cancer survivor. I'm one of them. My concern is is this site will create impact, negative impact to our human body. That's all my concern. I can only say there is an impact of electromagnetic field to our environment including our human body rather viable rather than income. That's it.

MS. RONGA: Susan Ronga, 214 Cheechunk Road. I want to know why the zoning doesn't need to be changed?

MR. GOLDEN: I'll go ahead and respond to that. The present zoning lists in the bulk tables this particular use for each of the zones and it simply says that it has to get special permit approval from the Town beforehand, that's why it doesn't need a change to the zoning. It's a process in the zoning that this is anticipated use and that use is a permitted use. So it doesn't need any zone change whatsoever.

MR. WIEGAND: Bruce Wiegand, 32 Owens Road. My major concerns are the views because we are in the scenic overlay. I'm not allowed to have a chain link fence or a

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number of other things. This utility will show to the road, it will show from my property, I'll be able to see it. If I can't do it we shouldn't allow the utilities to do it either. They need a special permit in order to build in the area and they should not be able to then violate the special use permit because of the electric codes.

The other thing I really worry about is the sound because of the transformers. I know that they have done studies on the ambient sounds in the area, but the ambient sound in the area is not a steady sound. You have the animal sounds that come and go as the animals go, and a car occasionally going by, this will be a steady sound from the transformers 24 hours a day seven days a week. And sound travels in that area because of the contours of the ground. The way the pastures are open sound moves dramatically. We can hear things that are happening down at the landfill on occasion but it's not a steady sound and it's usually occurring just during the day. But this will be during the evening hours, it will be during the night hours, all the time. And so even though they can measure the sound and say we are not going above what sound we've measured this sound can travel and it will be a steady sound. Thank you.

MR. HUDDLESTON: Okay, thank you.

MR. MULLANE: Hi, my name is Tom Mullane, I live on 3 Caralex Lane. Caralex Lane is a private road right off of Cheechunk Road. I know when I bought my house I knew the jail was there, okay that's on me. I knew that the transfer station, I knew that was there. I knew that you guys were building the 911 center, I knew that was there. Okay, how much more are we going to keep putting up on that side of town? I guaranty you I have one of highest property tax bills in this room. Okay, I can guaranty it but if you constantly keep putting things over there my property value will plummet. All right, let's forget about money for a second, okay, I moved over there for a reason and the reasons are bear, fox, deer, quail,

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pheasant. Let's see what else have I seen over there. I love living where I am. I'm in the middle of nowhere yet I'm at the Galleria or in town in five minutes.

My thing to the Board, and I have spoken to the Board about another project, you just can't keep taking that part of town and putting these things there. I know it's out of the way. When everybody thinks of Goshen they don't think of Cheechunk Road or McVay or over by the Twin Ponds, which you know we look at the cranes all the time and the herons. What you want to put there, the health aspects, all right, there's a million studies done either way, all right?

My final comment is you keep putting things over in that part of Goshen. We're now, it's more residential than it is commercial or industrial, whatever you want to call it, but please don't keep dumping everything over on our part of town because we really like it.

MR. HUDDLESTON: Thank you. Any other comments?

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MR. BOSS: Jerry Boss, Goshen. Myself, Kenny Newbold, the late Sandra Bach and others were involved in the investigation of why there were so many cancer cases along Cheechunk Road. If my memory serves me right I believe it was either 10 to 13. Sandra Bach, I think Michael Edelstein was involved in this as well as we had a meeting with the CDC and they deemed that it was not a cancer cluster but there certainly was cancer along that road.

You also have a situation there of the old Alturi Landfill, the Super Fun site, I don't know the proximity of that particular situation and these properties. And I had asked at one of these other meetings that the applicant perhaps do some testing to see if there's been any leaching from the old Super Fun site into this area and if the digging and whatever the construction is is it going to disrupt and/or disturb whatever may be in the earth in that area. End of story.

MR. HUDDLESTON: Thank you. Any other comments?

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MR. SCHOEN: Once again my name is Josh Schoen, 126 Cheechunk Road. There was a similar issue that we addressed with the Board also just to reiterate and at the time we pointed out since 2004 there have been six brand new residences that have gone up along Cheechunk Road coming down right by Hartley. This is going to lower our property values further. We're already in a horrible economy. I've watched the price of my house that I bought 2006 go from 680 to 480. We don't need more wires overhead where people are going to look at it. Even if they tell us it's safe people are going to look at it. Just like I look at the neighborhoods down in Goshen where they have the wires across and I wouldn't buy a house there. Other people are going to look at more wires across, they're going to say they're not going to want to buy it. If anything those wires need to be underground, they shouldn't be above head, it's an eye sore. I wasn't even aware of the noise, but it's a nice quiet road, you can already kind of hear the highway. We don't

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need more things. We already have the jail. We already have the construction. It's a nice quiet road which backs up enough when the highway gets busy, enough is enough.

MR. HUDDLESTON: Thank you. Other comments?

MR. NEWBOLD: I'll be brief. I remember the last -- the first time you came before the Town Board I pointed out the Monroe facility that you have, the wonderful facility but for security reasons because of the world we live in today Monroe is well lit, it's fenced and stuff, so I just wondered if the Board has addressed the security measures that it needs outside there and also the lighting plan. Will there be lighting pollution. I'm hearing animals and I'm hearing the concerns of the people but it just dawned on me what about lighting pollution. Will it be as lit as the Monroe facility, that will produce a lot of light. That's all, I wanted to make sure that this board addresses those two issues. Thank you.

MS. WIEGAND: I'm Nancy Wiegand from

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32 Owens Road. And I am concerned about everything everybody else said basically. When I was looking for my house, which I just moved in this house, been here almost five years. Before I bought it I didn't want a house next to power lines. We looked at several of them, I told my husband no way no how. I don't want this near my house. When I bought my house it was in the scenic corridor. I didn't think it was going to be there. So now what do I do? I mean I just bought this house and now the power lines are going to follow me there? I'm concerned about the value of my house. I'm just, there's a lot of safety issues here. I don't like the lighting, I don't like the electromagnetic field, I'm worried what it's going to do to my water, my well.

MR. HUDDLESTON: Thank you.

MR. MULLANE: Tomorrow Mullane, 3 Caralex Lane. Nobody brought up the one word children, which I omitted. The bus stops seven or eight times right along Cheechunk Road now. Everybody that just stood up, all

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right, on Cheechunk Road they all have children. Yours are in college, yours don't count anymore, but we all have children. That's another thing, okay? I mean I've lived there for 11 years now, this is only the second time I've ever heard of anything to do about cancer on Cheechunk Road, all right? I have my well tested once a year anyway, so far my water is good but I live up on top of the hill. So let's keep in mind here the school bus that goes through Cheechunk Road every day, okay, and all those little people. If there's a chance that any one of those kids are going to be harmed by this electric station hey, that's kind of a no-brainer, isn't it?

MR. HUDDLESTON: Other comments?

MR. NEWBOLD: When this Planning Board went through the jail site the County assured the people out there that there would be no lighting pollution. And you see that lighting miles and miles and miles away. That's why I just had that issue, that's all.

MR. HUDDLESTON: Other comments?

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Comments from the Board, professionals, counsel?

MR. GOLDEN: No.

MR. HUDDLESTON: Okay, all right, thank you very much. Everybody has had their say. Anybody see a reason not to close the public hearing tonight? No? All right, can I have a motion to close the public hearing for the proposed Hartley Road electrical substation?

MS. CLEAVER: I'll make that motion.

MR. GAWRONSKI: Second.

MR. HUDDLESTON: All in favor please say aye?

MR. ANDREWS: Aye.

MS. CLEAVER: Aye.

MR. GAWRONSKI: Aye.

MR. BERGUS: Aye.

MR. LUPINSKI: Aye.

MR. PIRRAGLIA: Aye.

MR. HUDDLESTON: Aye.

The public hearing from the Planning Board point of view is closed.

MR. BLOOMFIELD: Will someone from the

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Town Board please make a motion to close the public hearing regarding the application by Orange & Rockland to build an electrical substation on Hartley Road?

MR. NEWBOLD: So moved.

MR. CAPPELLA: Second.

MR. BLOOMFIELD: Any discussion? All in favor say aye?

MR. NEWBOLD: Aye.

MR. LYONS: Aye.

MR. CAPPELLA: Aye.

MR. CANTERINO: Aye.

MR. BLOOMFIELD: Aye.

Motion carries.

MR. GOLDEN: From the Planning Board's point of view under its SEQRA rule the Planning Board will accept written comments until January 30th of 2012. And any comments received by that time will be responded to by the applicant, they will be forwarded to the applicant and they're required to respond to all of those comments as well as the comments made this evening in their final environmental impact statement, the FEIS.

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And when the FEIS comes in this Board will discuss it, it will be available for public inspection.

And one of the issues, one of the main issues that involved the FEIS is the adequacy of the responses to the questions raised both in writing and during tonight's public hearing.

MR. HUDDLESTON: Okay, and, Neal, we accept in writing at the building department office?

MR. HALLORAN: Yes.

MR. HUDDLESTON: Do you we accept e-mail?

MR. HALLORAN: We'll accept e-mail also, yes.

MR. HUDDLESTON: So we do accept e-mail comments, we accept written comments. The date again was?

MR. GOLDEN: January 30th.

MR. HUDDLESTON: Up until January 30th, okay?

MR. HALLORAN: The DEIS is online on the Town's website.

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MS. CLEAVER: Do you have that page of the diagram that's missing added to the online as well as to the Board?

MR. HALLORAN: We will make sure.

MR. LINDSAY: I'll scan it tomorrow and we'll send it over to Neal and every Board member.

MR. HUDDLESTON: Figure six will be available in the document online as well as there's a hard copy available, as well as the copy available in the planning department.

Yes, Mr. Lipman?

MR. LIPMAN: Your public hearing that you conducted was for two reasons, SEQRA and the site plan approval?

MR. HUDDLESTON: Yes, sir.

MR. LIPMAN: Was it your intention to close both?

MR. GOLDEN: Yes.

MR. HUDDLESTON: Yes, both are closed. Okay? All right. Thank you very much. That concludes this item for tonight.

MR. BLOOMFIELD: Would someone like to make a motion the Town Board adjourn this

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meeting?
MR. CANTERINO: So moved.
MR. LYONS: Second.
MR. BLOOMFIELD: Any discussion? All in favor say aye?
MR. NEWBOLD: Aye.
MR. LYONS: Aye.
MR. CAPPELLA: Aye.
MR. CANTERINO: Aye.
MR. BLOOMFIELD: Aye.
(The meeting was concluded.)
* * *

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C E R T I F I C A T I O N

THE FOREGOING IS CERTIFIED to be a true and correct transcription of the original stenographic minutes to the best of my ability.

Roberta O'Rourke

LAWYER'S NOTES/ERRATA SHEET

Page	Line	

APPENDIX B

Full Size Site Plan

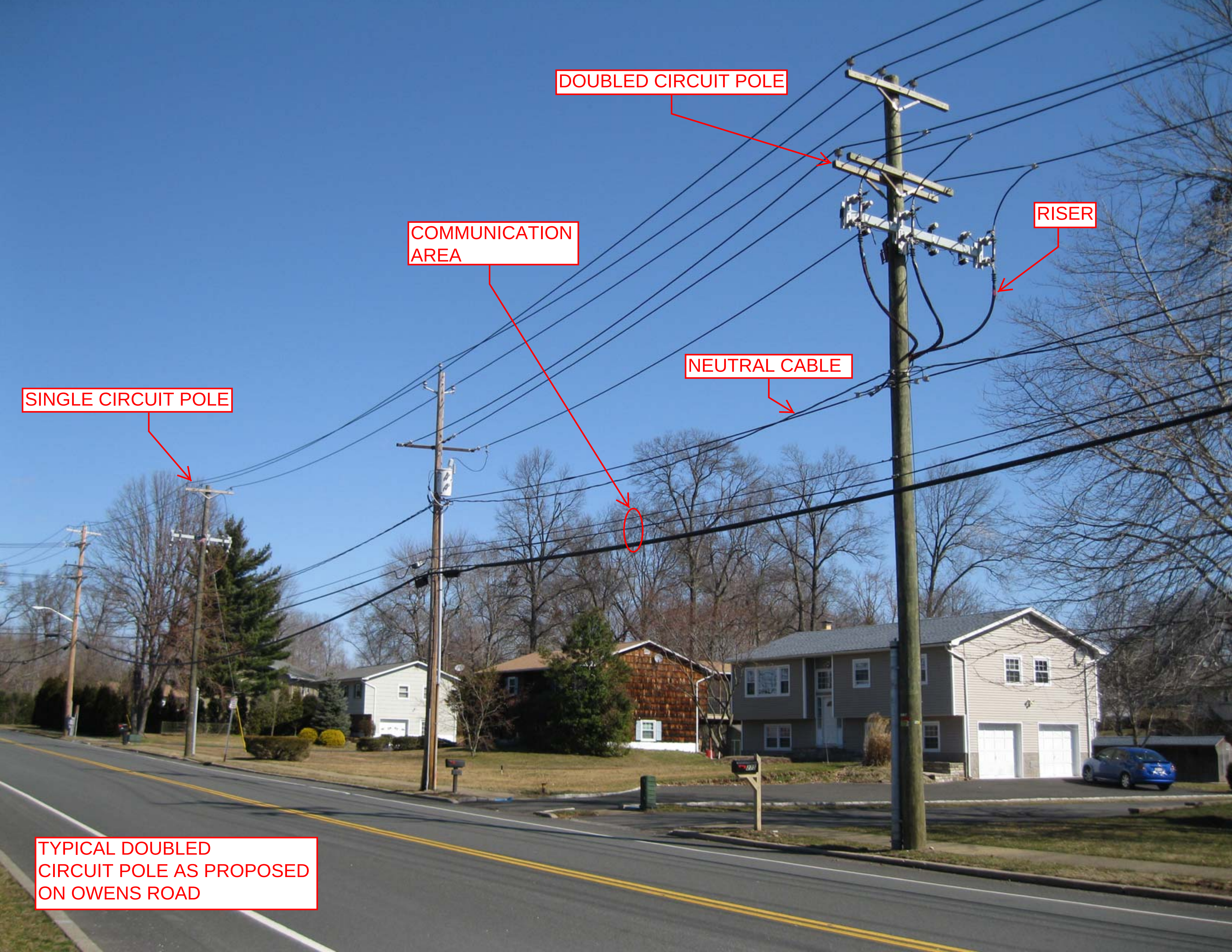
APPENDIX B1

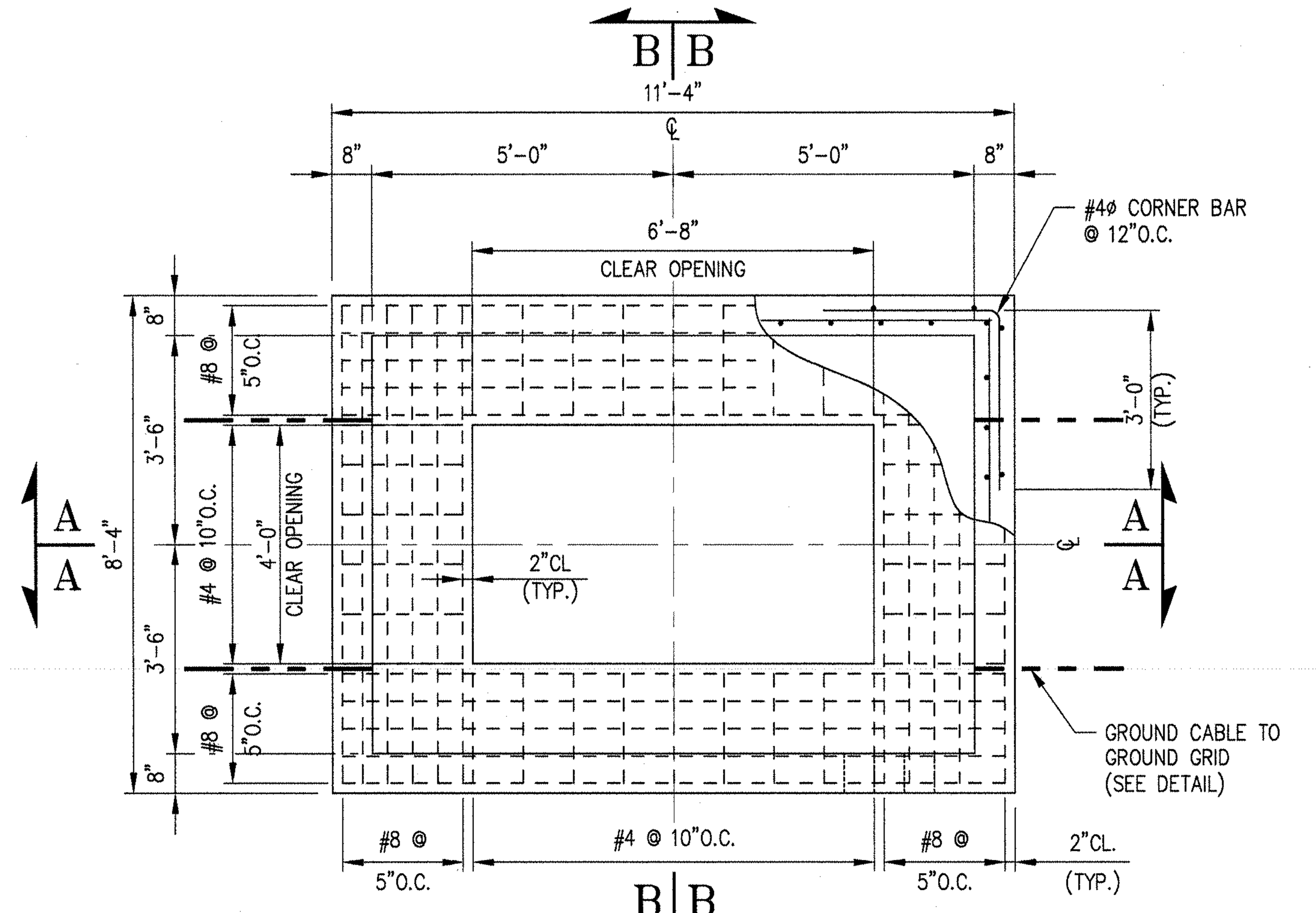
Underground/Overhead Distribution Improvements Plan

APPENDIX B2

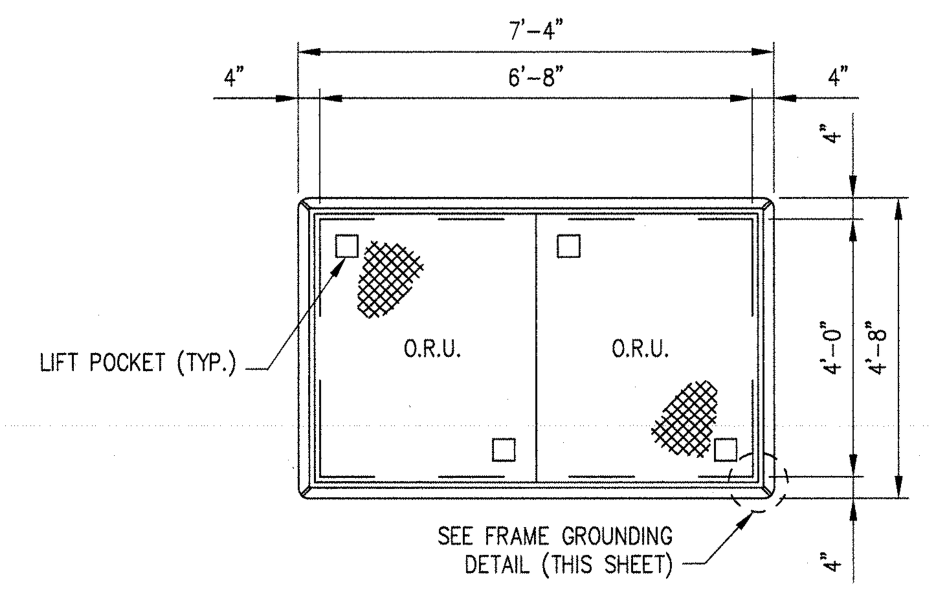
Distribution Details


SINGLE CIRCUIT POLE
NEUTRAL CABLE
COMMUNICATION AREA
WEIGHT LIMIT 5 TONS
EXISTING OVERHEAD DISTRIBUTION CIRCUIT ON OWENS ROAD

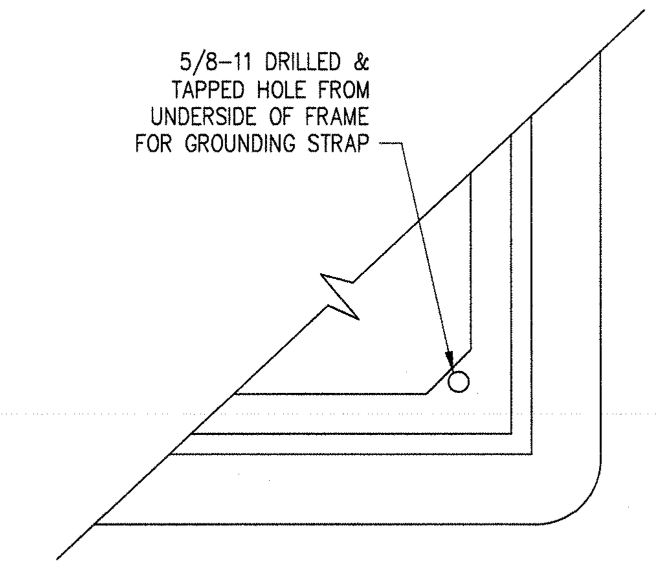

DOUBLED CIRCUIT POLE
COMMUNICATION AREA
RISER
NEUTRAL CABLE
SINGLE CIRCUIT POLE
TYPICAL DOUBLED CIRCUIT POLE AS PROPOSED ON OWENS ROAD



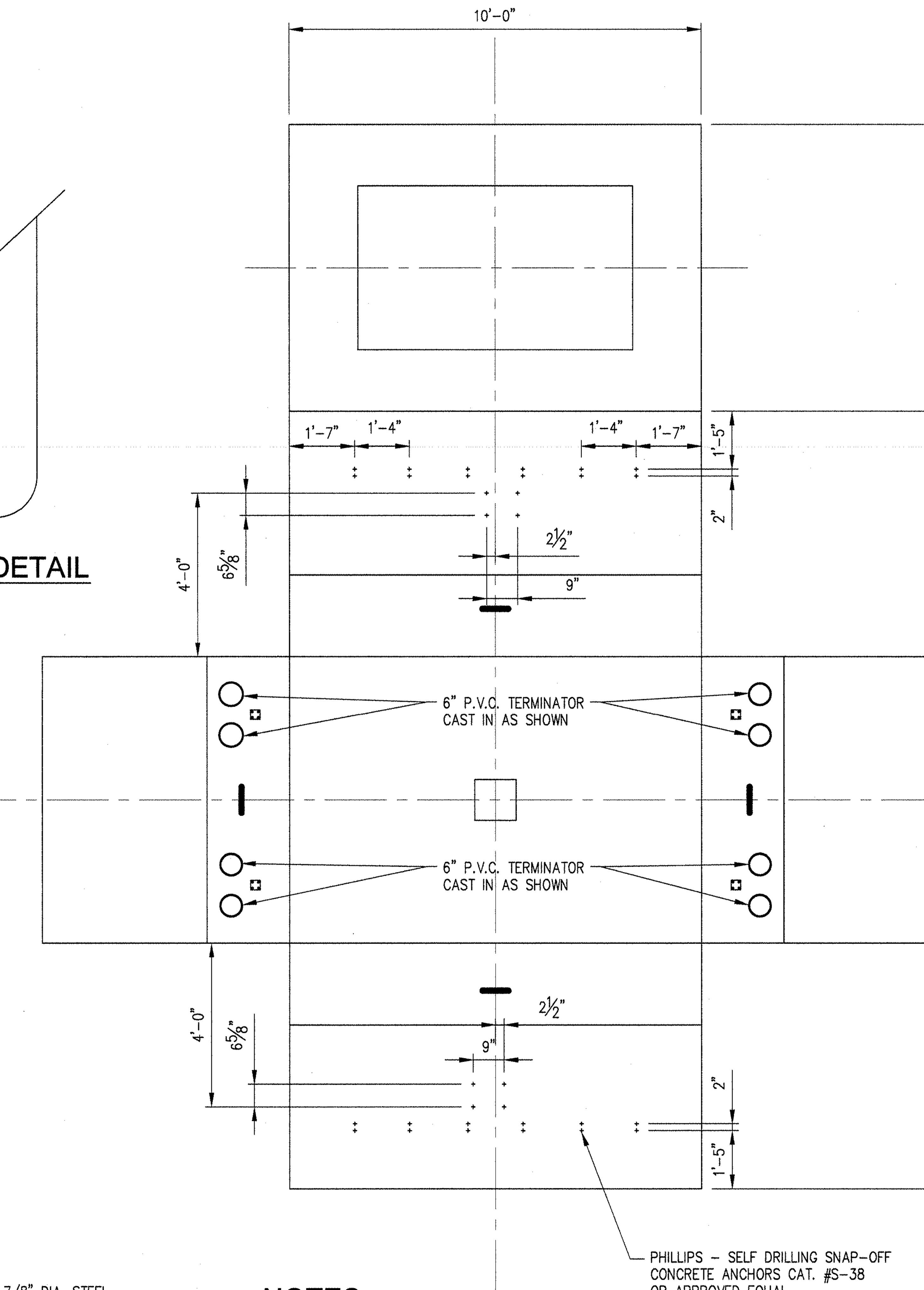
PLAN
(WITHOUT COVER)

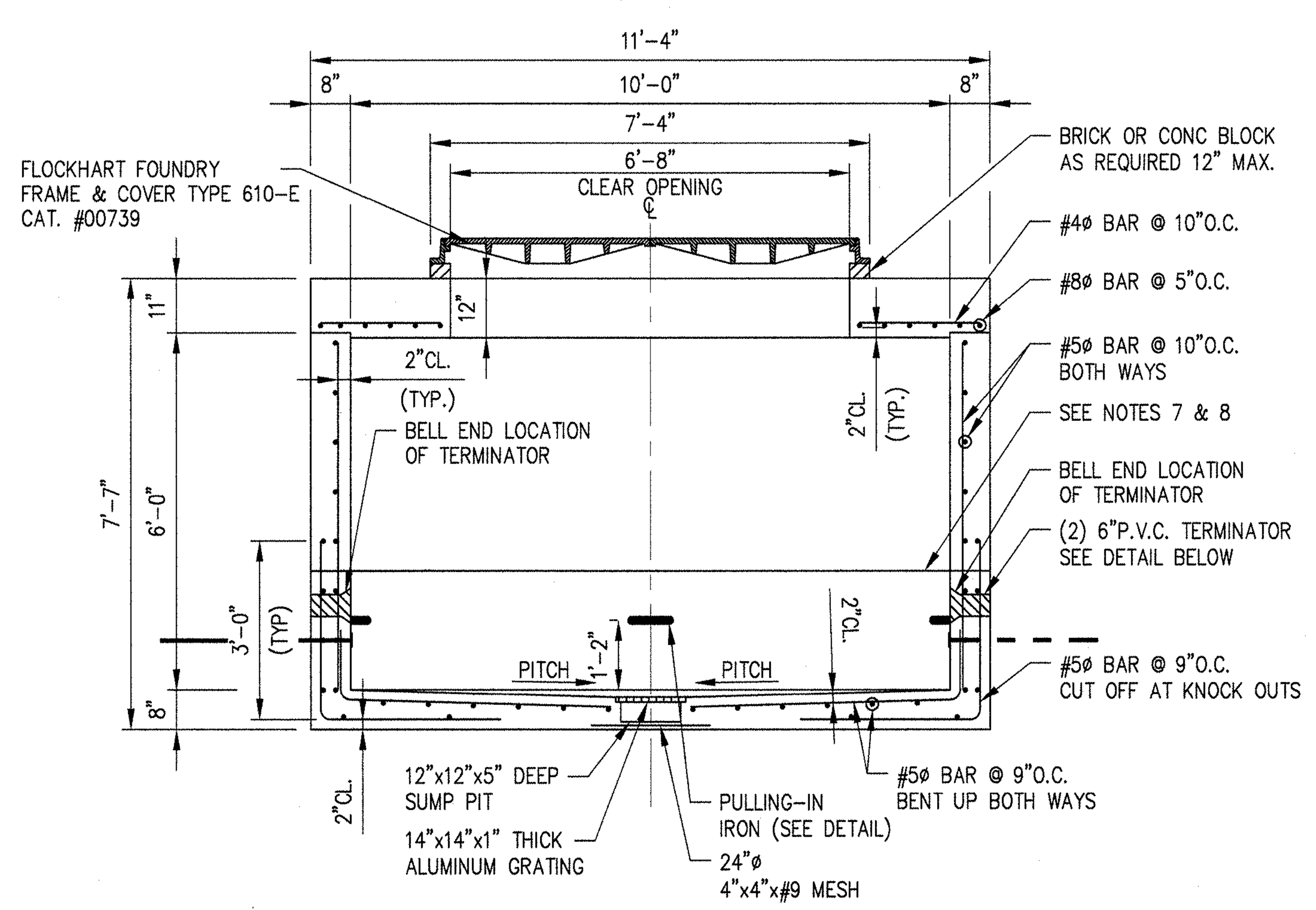


TYPICAL MANHOLE FRAME & COVER
ORANGE & ROCKLAND UTILITIES STOCK NUMBER 487-090

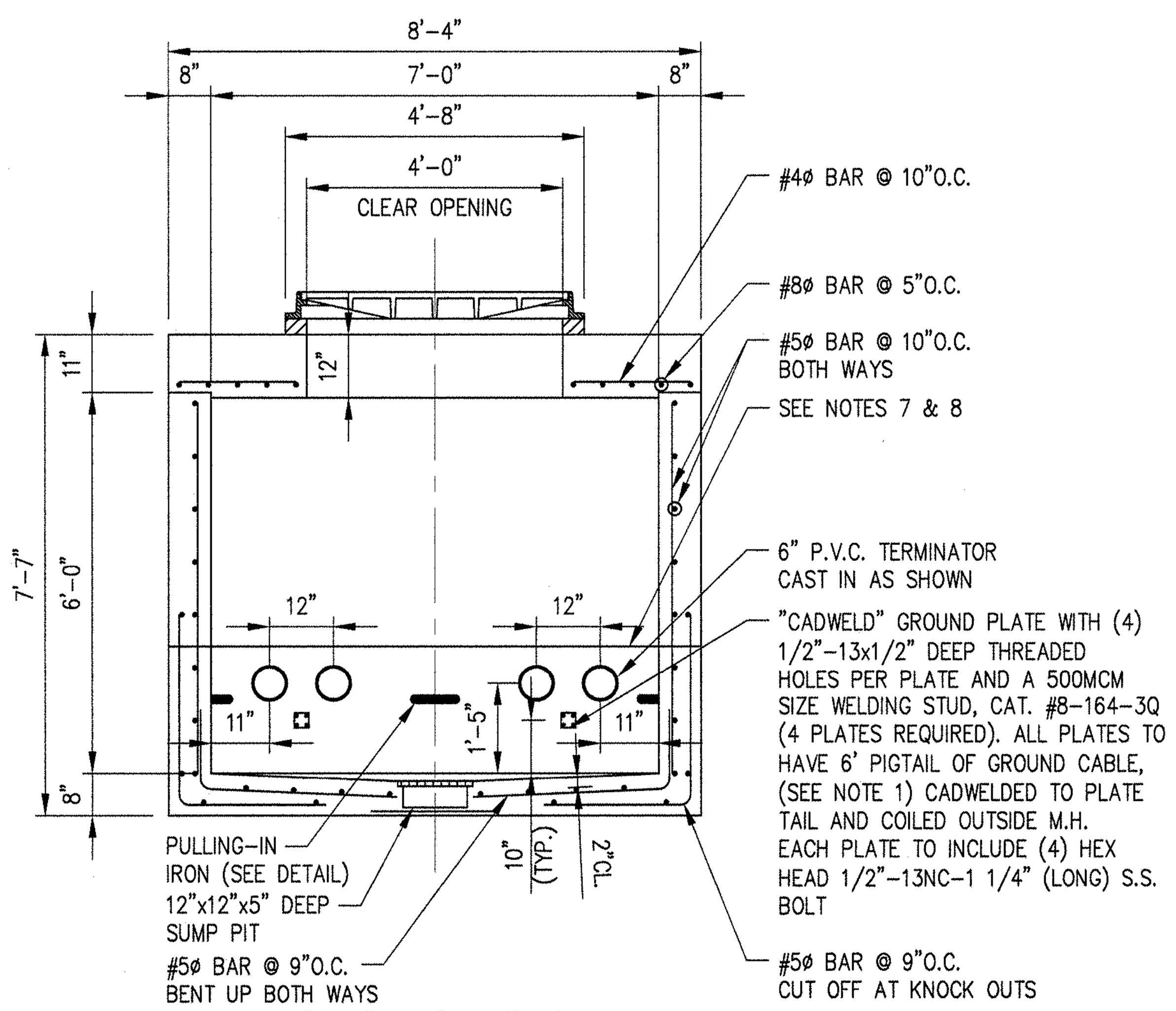


FRAME GROUNDING DETAIL

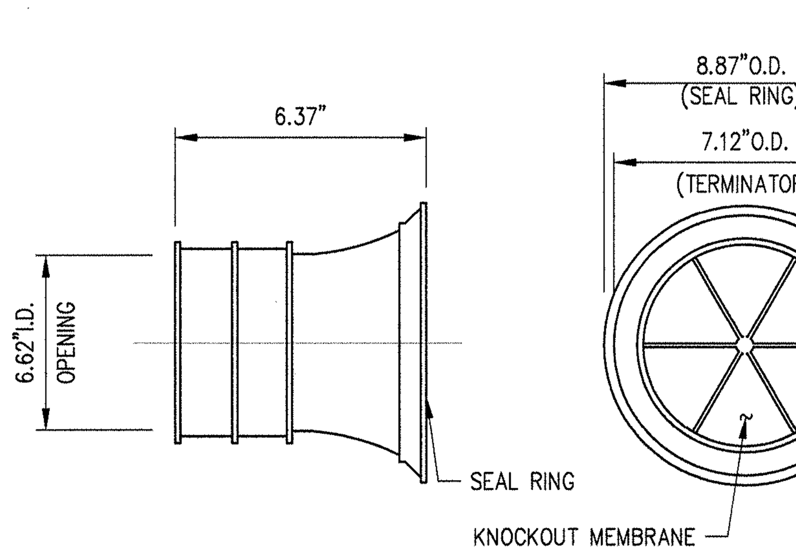




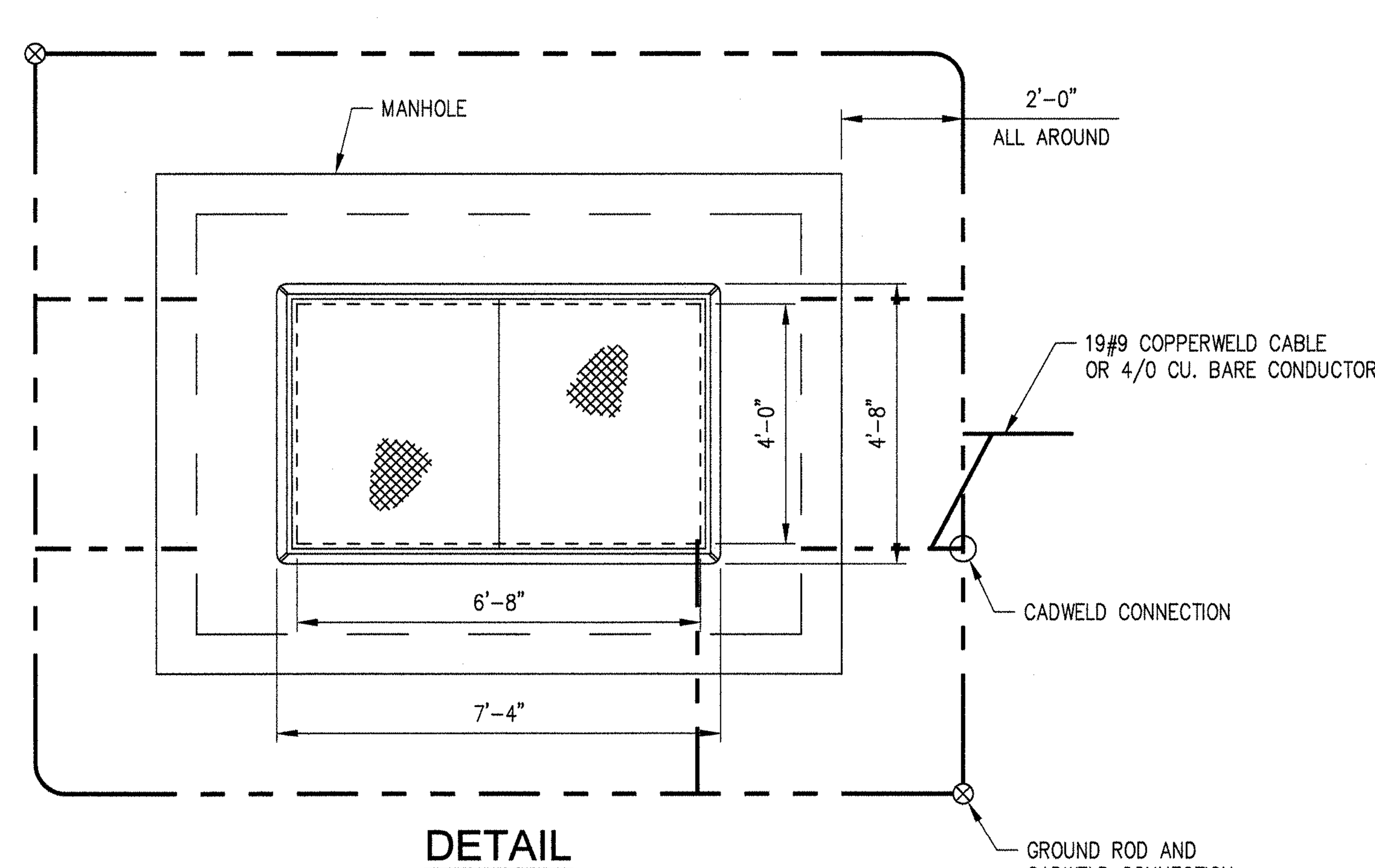
SECTION A-A



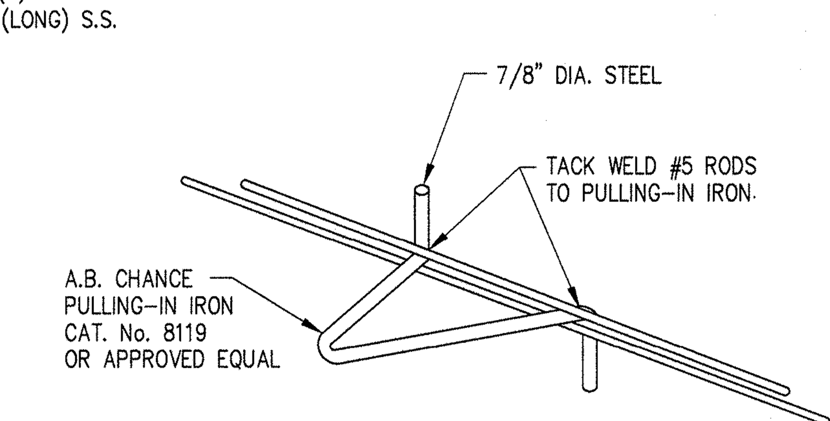
SECTION B-B



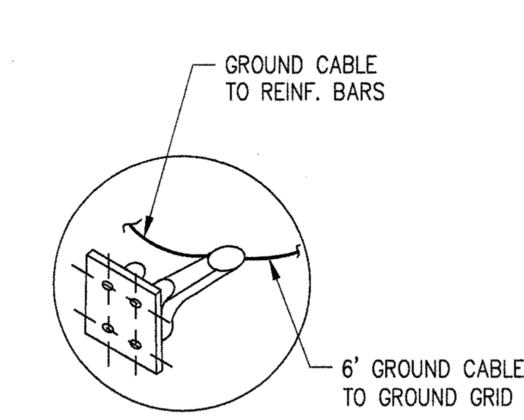
6"P.V.C. TERMINATOR (SCH. #40 ONLY)
PA. INSERT CORP. CAT. No. TE-6BS
OR APPROVED EQUAL



DETAIL
TYPICAL DISTRIBUTION MANHOLE GROUNDING DETAIL



PULLING-IN IRON DETAIL



GROUNDING CONNECTION DETAIL

NOTES:

1. ALL GROUND CABLES TO BE 19 STR.#9 TYPE D.S.A. 40% CONDUCTIVITY COPPERWELD. .572 O.D.
2. CONCRETE SHALL BE AIR ENTRAINED CONCRETE THAT WILL TEST TO 4000 P.S.I. AT 28 DAYS.
3. FOUR (4) LIFTING HOOKS TO BE PROVIDED WITH CAPACITY TO HANDLE MANHOLE SAFELY AND SUBJECT TO ENGINEERS APPROVAL.
4. MANHOLE TO BE MARKED CLEARLY SHOWING DATE UNIT WAS POURED AND RECORDED AT THE SUPPLIERS YARD.
5. NO TRAFFIC TO BE PERMITTED ON MANHOLE UNTIL 28 DAYS AFTER POUR DATE.
6. ALL REINFORCING BAR SPLICES SHALL HAVE A MIN. 30 DIA. LAP.
7. MANHOLE FABRICATED IN THREE SECTIONS:
   8" BASE & 2' OF WALL - APPROX. WEIGHT 16,890
   4' RISER - APPROX. WEIGHT 14,742
   12" ROOF SECTION - APPROX. WEIGHT 14,256
8. FABRICATOR TO PROVIDE BUTYL RUBBER GASKET MATERIAL TO SEAL BETWEEN SECTIONS AND ASPHALT JOINT WRAP FOR OUTSIDE SEAL BETWEEN TOP & BOTTOM SECTIONS.

REV	REVISION	DWN	DES	CHKD	DATE

ORANGE AND ROCKLAND UTILITIES, INC.
PEARL RIVER NEW YORK

ENGINEERING REVIEW		
DEPT.	SIGNATURE	DATE
CIVIL/SURVEY		
TELECOM/MET.		
TRANS & SUB.		
RELAY		
DIST. ENG.		4-13-11
DWN J.M.	DES	CHKD
DESIGN REVIEW		4-12-11

APPROVED
DATE 4-13-11
☐ PERMIT
☐ BID
☒ CONSTRUCTION
☐ RECORD

DISTRIBUTION

CONSTRUCTION & GROUNDING DETAILS FOR STANDARD 10' x 7' x 6' 3 SECTION MANHOLE

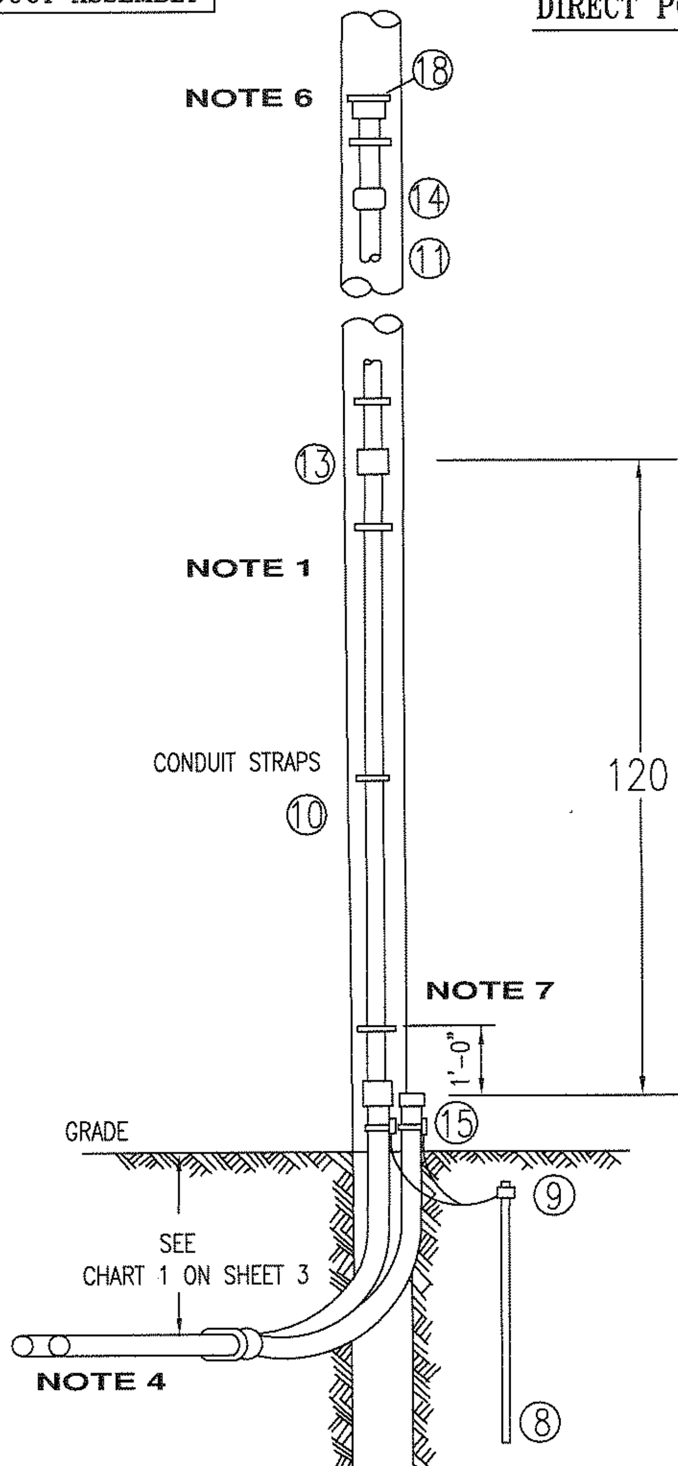
SCALE	STATION NO.	DRAWING NUMBER			SHEET	REV.
NONE		N	F	9178	5 OF 6	0

ARCH 0 1 2 3
ENGRG
REDUCTION RATIO

I:\Tsdd_WORKREQ\CIVIL_Manhole Standards\09009C Manhole Standard Drawings for Vito\Distribution\N9178S05.dwg, 4/12/2011 1:57:24 PM

C-16-001.1 RISER DUCT ASSEMBLY

DIRECT POLE ATTACHMENT



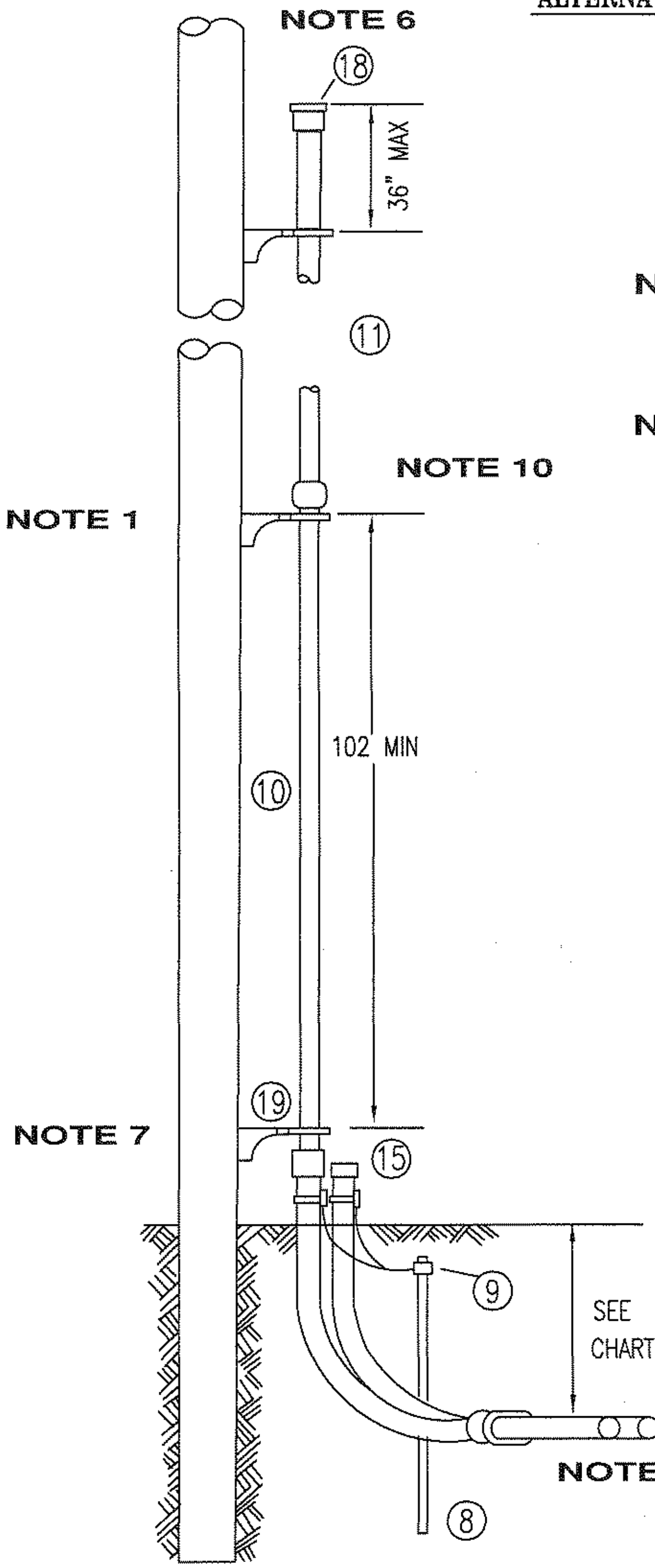
◄ DENOTES LATEST REVISION.

STD. ENGR.	ELEC. ENGR.	OPERATIONS	ISSUE
Joel Finnerty — Digitally signed by Joel Finnerty DN: cn=Joel Finnerty, c=US, email=finnertyj@oru.com Date: 2008.09.30 15:58:59 -04'00'	Charles Scirbona — Digitally signed by Charles Scirbona DN: cn=Charles Scirbona, c=US, ou=Distribution Engineering Date: 2009.01.22 14:04:07 -05'00'	Matthew Sniffen — Digitally signed by Matthew Sniffen DN: cn=Matthew Sniffen, o=Electric Operations, ou=Director, email=sniffenm@oru.com, c=US Date: 2009.04.13 09:32:13 -04'00'	5
			DATE 04/10/2009

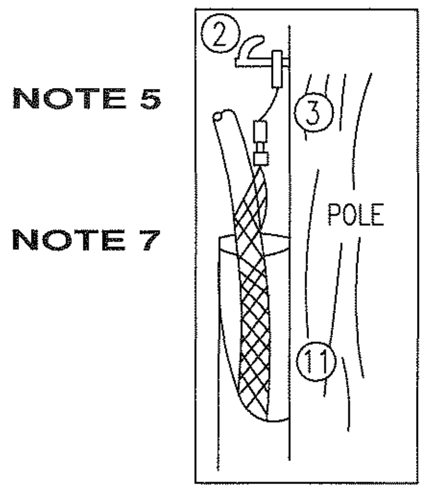
STANDARD NO.	ORANGE AND ROCKLAND UTILITIES, INC.
C-16-001	ELECTRIC DISTRIBUTION STANDARDS
SHEET 2 OF 4	TERMINAL POLE RISER

C-16-001.2 CONDUIT STANDOFF BRACKETS

ALTERNATIVE METHOD: OFFSET RISER



SINGLE CABLE
RISER INSTALLATION



DENOTES LATEST REVISION.

1. RISER PIPES SHALL BE LOCATED ON A STREET QUARTER OF THE POLE AND, WHEN PRACTICAL OPPISITE APPROACHING TRAFFIC.

2. A RISER MAY BE INSTALLED WHERE A DUCT LINE TRAVERSES AN OPEN AREA WHICH WILL NOT BECOME SIDEWALK OR STREET.

3. FOR CONDUIT IN BRIDGES, CONTACT DISTRIBUTION ENGINEERING DEPARTMENT.

4. MAXIMUM OF TWO 6" CONDUITS PER RISER POLE.

5. CABLE GRIPS (M-6-68.2X) ARE REQUIRED FOR THREE (3) CONDUCTOR CABLE (THREE PRIMARY CABLES INSTALLED IN ONE JACKET).

6. CABLE VENTILATOR SUPPORTS (M-18-5.03) ARE TO BE INSTALLED ON MAINLINE RISERS.

7. DO NOT PLUG PORTS WHEN VENTILATORS ARE USED.

8. FOR NEW YORK STATE DEPARTMENT OF TRANSPORTATION (NYSDOT) RIGHTS-OF-WAY AND HIGHWAYS, THE MINIMUM DEPTH FOR UNDERGROUND FACILITIES IS:

    A. WITHIN THE ROADWAY: 60" BELOW THE TOP OF PAVEMENT
    B. OUTSIDE THE ROADWAY AND WITHIN THE RIGHTS-OF-WAY: 36" BELOW FINISHED GRADE. INSTALLATIONS OF LESSER DEPTHS REQUIRE WRITTEN APPROVAL AS ALLOWED IN PART OF 131.9 OF TITLE 17, NYCRR ACCOMMODATION OF UTILITIES WITHIN STATE HIGHWAY RIGHTS-OF-WAY.

9. FOR SINGLE PHASE 2.4 KV OR 4.8 KV DELTA PRIMARY SERVICES (#2 AL), BOTTOM SECTION OF CONDUIT AND SWEEP SHALL BE SCHEDULE 80 PVC.

10. INSTALL TWO (2) CONDUIT STANDOFF BRACKETS PER TEN FOOT (10') SECTION OF CONDUIT WITH A 102 INCH SEPARATION BETWEEN BRACKETS.

Minimum Depth Below Grade*			
Secondary			
	PVC or PE Conduit Encased in Concrete	Steel Conduit	PVC or PE Direct Buried
Under Sidewalk	24"	24"	
Under Street	30"	24"	
Note 2			24"
Primary			
Under Sidewalk	36"	36"	
Under Street	36"	36"	

CHART 1: COVER

Denotes Revision

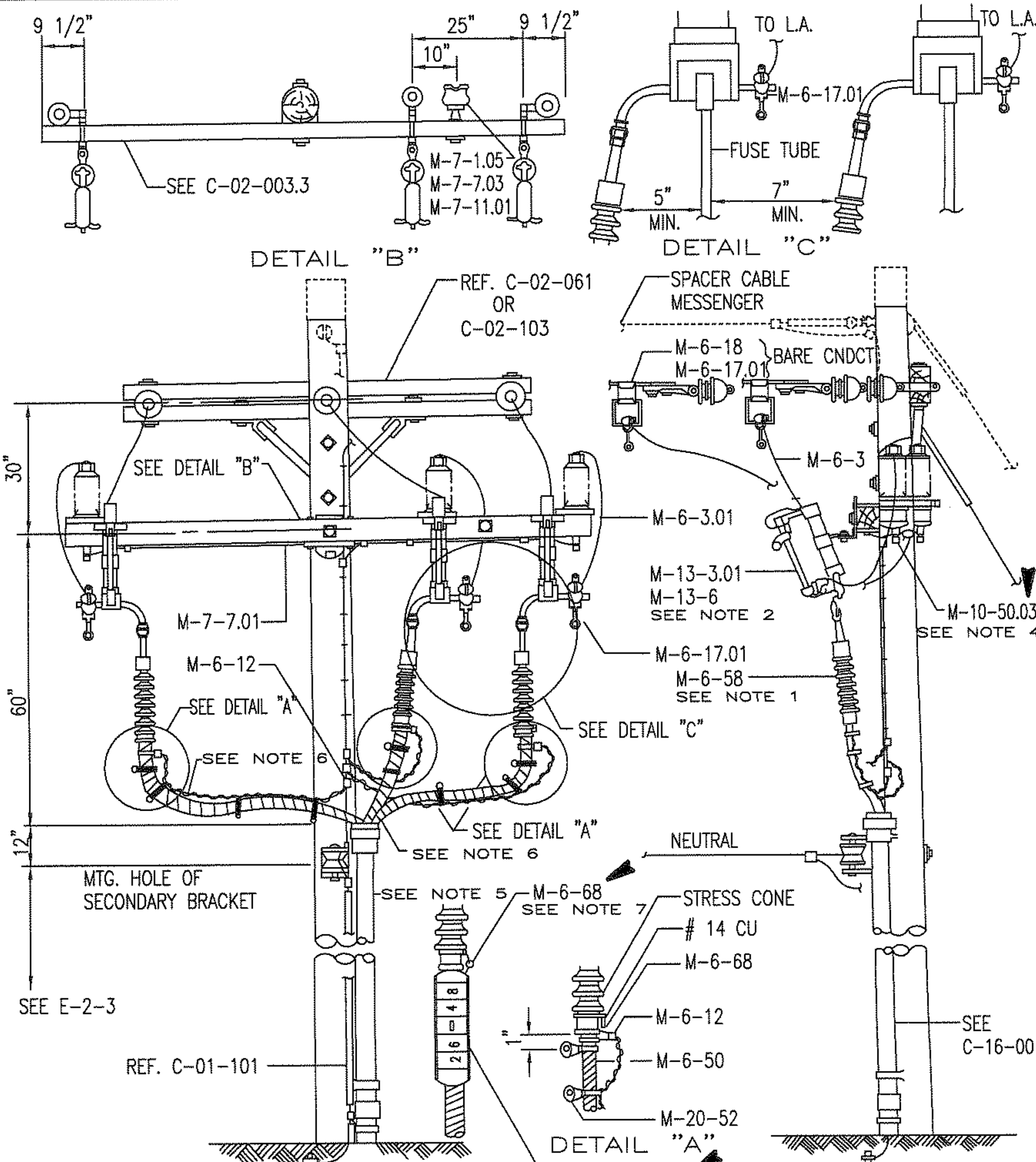
ITEM	STAND. NO	QUAN. 1	QUAN .2	DESCRIPTION	CODE NO
1	M-6-51.55	#	#	#2 BARE GROUNDING CONDUCTOR	330080
2	M-6-68.24	1*	1*	DRIVE HOOK, 7/16 INCH DIAMETER	4380XX
3	M-6-68.XX	*	*	CABLE SUPPORT GRIP	936010
4	M-8-15.04	#	#	LAG SCREW - 1/2" X 4" LONG	960001
5	M-8-15.06	#	#	LAG SCREW - 1/4" X 2 1/2" LONG	960003
6	M-8-16.12	#	#	ROUND WASHER FOR 1/2" BOLT	983020
7	M-8-16.15	#	#	RD. WASHER FOR 1/4" BOLT	983055
8	M-9-2.XX	1*	1*	GROUND ROD 5/8 INCH BY 8 FT LG	266045
9	M-9-4.01	1 (2*)	1 (2*)	GROUND WIRE CLAMP FOR 5/8" GROUND ROD	881001
10	M-18-1.XX	#	#	STEEL CONDUIT	165XXX
11	M-18-1.XX	#	#	PVC OR PE CONDUIT	427XXX
12	M-18-2.XX	1 (2*)	1 (2*)	STEEL CONDUIT 'BEND'	128XXX
13	M-18-2.XX	#	#	PVC TO STEEL COUPLING	XXXXXX
14	M-18-2.XX	#	#	PVC TO PVC OR PE TO PE COUPLING	911XXX
15	M-18-2.XX	#*	#*	THREADED STEEL PIPE CAP	154XXX
16	M-18-3.XX	#	#	TWO-HOLE CONDUIT STRAP	973XXX
17	M-18-5.03	1*	1*	VENTILATED SPLIT CABLE SUPPORT	414078
18	M-18-5.26	1*	1*	CONDUIT VENTILATORS	414084
19	M-18.3XX	*	*	STANDOFF BRACKET ASSEMBLY	9731XX

MATERIAL AS LISTED IN THE FOLLOWING CONSTRUCTION STANDARDS

C-01-101	STANDARD GROUNDING INSTALLATION

* WHEN REQUIRED
# QUANTITY AS REQUIRED
XX MISSING DIGITS ARE DETERMINED BY THE TYPE, SIZE OR LENGTH OF THIS ITEM

ORANGE AND ROCKLAND UTILITIES, INC.	STANDARD NO. C-16-002
ELECTRIC DISTRIBUTION STANDARDS	SHEET
TERM POLE FOR OVHD TO UGND CONST. W/200 AMPS CO'S -7.62/13.2KV SYSTEM	1



NOTES:

1. FOR STRESS CONE PROCEDURE, SEE MANUFACTURER'S INSTRUCTIONS.
2. MOUNT CUTOUT AT RIGHT ANGLES TO CROSSARM (DO NOT TURN TOWARDS POLE.)
3. LINE SIDE LIGHTNING ARRESTERS (M-10-1.04)ARE TO BE LOCATED ONE POLE SECTION AWAY AS PER C-0600).
4. FLEXIBLE WIRE SUPPLIED WITH L.A.
5. MIN. CONDUIT SIZE IS 4" I.D.
6. THE RADIUS OF THE BEND IN THE CABLE SHALL NOT BE LESS THAN 7 TIMES THE OVERALL DIAMETER OF THE CABLE.
7. INSTALL GRID COORDINATE AND PHASE ID TAG AS PER C-10-059.

DENOTES LATEST REVISION.

XMSN. STD. ENGR N/A	XMSN. ELEC. ENGR. N/A	XMSN. OPERATIONS N/A	ISSUE 4
STD. ENGR.	ELEC. ENGR.	OPERATIONS	DATE
SAFETY	GAS ENGR. N/A	REAL ESTATE N/A	

STAND. NO.	QUANT.	DESCRIPTION	MS CODE NO.
M-10-50.03	3	RISER POLE LIGHTNING ARRESTER	111035
M-13-3.01	3	15KV OPEN-TYPE CUTOUT	181015
M-13-6.XX	3	NEMA 'K' FUSE LINK	922XXX
M-20-52.XX	#	SELF-LOCKING NYLON CABLE TIES	982XXX
M-6-1.02	#	#2 CU MHD WP	330085
M-6-17.01	3 (#*)	HOT LINE CLAMP	881120
M-6-17.03	3*	HOT LINE PIERCING CLAMP	881125
M-6-17.04	#*	REPLACEMENT SPACER BAR FOR M-6-17.03	910022
M-6-18.XX	3*	AMPACT STIRRUP	910XXX
M-6-3.01	#	#2 CU PRIMARY TAP CONDUCTOR	150155
M-6-3.02	#*	2/0 CU PRIMARY TAP CONDUCTOR	150240
M-6-3.10	#	#2 CU CONDUCTOR	330085
M-6-50.XX	#	15KV PRIMARY UNDERGROUND CONDUCTOR	422XXX
M-6-58.XX	3	15KV PRIMARY CABLE OUTDOOR TERMINATION	432XXX
M-7-1.05	1	'C' NECK PIN-TYPE INSULATOR	940005
M-7-11.01	1	STEEL PIN	948050
M-7-7.01	#	#6 BARE CU LAS BUSS WIRE	990010
M-7-7.03	1	PLASTIC TIE FOR 'C' NECK INSULATOR	982060
M-9-3.03	#	COPPERWELD STAPLES	968005

STANDARDS ENGINEER	MANAGER DISTRIBUTION ENG.	ELECTRIC OPERATIONS

APPENDIX C

Visual Resource Evaluation

APPENDIX C1

Lighting Details

Hi-Power LED Shoebox, Variable-Mount Luminaire

SLL003P-70X2W-XPW-005

Only 147 Watts of Power Consumed — Over 65% Energy Savings

Replaces 300-360 Watt HPS or Metal Halide Fixtures — Typical Mounting Height: 14-24 feet

FEATURES

- **Warranty:** 5 Years
- **Very Low Power Consumption:** Only 147 Watts
- **Long Life:** White LEDs Last for up to 50,000+ Hours of Continuous Operation
- **Less Weight:** Weighs Only 24 lbs as Compared to 39-42 lbs Conventional Lighting
- **Optimized Circuitry:** Power Factor Corrected for Maximum Efficiency
- **Max Foot Candela:** 3,861 cd @ Hor: 0, Ver: 0
- **Highest-Grade LEDs:** Uses CREE XR-E that Meets LM-79/LM-80 Requirements
- **Meets IP65 Requirements:** Totally Protected against Dust; Protected against Low-Pressure Jets of Water from All Directions. Limited Ingress Permitted.
- **Saftey Assurance:** ETL Listed
- **Ambient Operating Temp. Range:** ~-22°F to ~+122°F [~-30°C to ~+50°C]

Intertek

BENEFITS

- **Major Energy Savings:** Over 75% Compared to Incandescents
- **Solid-State:** High-Shock- & High-Vibration-Resistant
- **Instant-On:** No Delay in Re-Strike
- **No Harmful Emissions:** No Ultraviolet, No Infrared
- **Reduces Light Pollution:** No Wasted Light, "Dark Skies Initiative"-Friendly
- **Enhances Vision:** Better Optical Acuity, Little or No Disability Glare as Compared with High Glare from HID Lamps
- **High CRI** of 72.5 Enhances All Colors

SPECIFICATIONS

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

PART NO.	SLL003P-70X2W-XPW-005
Emitted Color	Pure White
Color Temperature	6000K
Beam Pattern	Type V
50% Field of View	90°-95°
Input Voltage	100-277 VAC [Tested @ 120VAC]
Input Current	1231mA
LED Forward Current	510mA
Energy Used	147 Watts
Power Factor	0.99
Total Lumens	7,384 lm
Max. Candela	3,861 cd
Efficacy	50.2 lm/W
IP Code	IP65
Dimensions	W16½ in x H16½ in x D7 in [41.8cm x 41.8 cm x 17.7 cm]
Weight	24 lbs [11 kg]

APPLICATIONS

- Parking Lots/ Structures
- Roadway/Street Lighthing
- Building Mounts
- Up/Down Spotlighting
- Pole-Mounted Area Lighting
- Sign Lighting
- For Tunnels, Caves, Mines
- Parks/Walkway Illumination

MATERIALS / CONSTRUCTION

- **Housing:** Die-cast aluminum housing and hinged front frame, ½" coin plugs for conduit and photocell, textured architectural bronze powdercoat finish over a chromate conversion coating
- **Lens:** Tempered flat clear glass lens
- **Fixture** is intended for indoor or outdoor use, and designed to protect against windblown dust, rain, splashing and direct hose "washdowns"

CUSTOM OPTIONS [For qualified applications & large-quantity OEM orders]

- Other Voltages Available
- Other LED Colors
- Other Color Finishes
- Narrow or Wider Viewing Angle
- Various Mounting Hardware

www.LEDtronics.com

LOG **263** / Rev 09-2010

Check **LEDTRONICS.COM** for latest data. Printed material may be outdated.

LEDTRONICS, INC.®
THE FUTURE OF LIGHT

23105 Kashiwa Court, Torrance, CA 90505
Phone: (800) 579.4875 / (310) 534.1505
Fax: (310) 534.1424
E-mail: webmaster@ledtronics.com
Website: http://www.ledtronics.com

CERTIFIED by DNV ISO 9001:2000

Hi-Power LED Shoebox, Variable-Mount Streetlight & Roadway Luminaire

SLL003P-70X2W-XPW-005

Luminaire Photometric Report

Filename: SLL003P-70X2W-XPW-005
Manufacturer: LEDTRONICS -
Luminaire: WITH CLEAR LENS,120VAC,147W,AL73 HOUSING,7X10,5.1A
Luminaire Cat: SLL003P-70X2W-XPW-005
Lamp: . LUMEN RATING: 7383.8Lms.
Lamp Output: 1 lamp(s), rated lamp lumens: 7383.8
Max Candela: 3,861.0 at Horizontal: 0, Vertical: 0
Luminous Opening: Point
Test: 8-24-09

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0-30	2,770.6	37.5%	37.5%
0-40	4,398.8	59.6%	59.6%
0-60	6,677.6	90.4%	90.4%
60-90	706.1	9.6%	9.6%
0-90	7,383.8	100%	100%
0-180	7,383.8	100%	100%

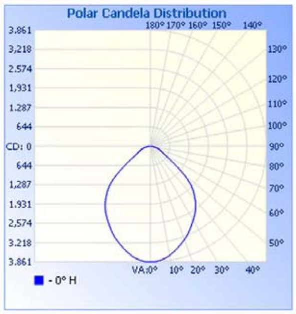
Total Efficiency: 100%

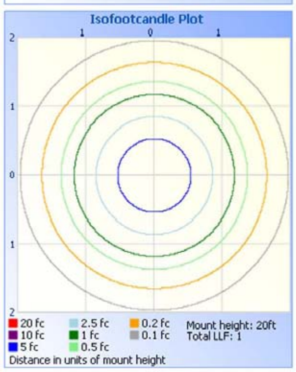
Illuminance at a Distance

	Center Beam FC	Beam Width	
3.3ft	347.49 fc	6.7ft	6.7ft
6.7ft	86.87 fc	13.4ft	13.4ft
10.0ft	38.61 fc	20.1ft	20.1ft
13.3ft	21.72 fc	26.8ft	26.8ft
16.7ft	13.90 fc	33.5ft	33.5ft
20.0ft	9.65 fc	40.2ft	40.2ft

Vert. Spread: 90.3° Horiz. Spread: 90.3°

20 FEET





Luminaire Photometric Report

Filename: SLL003P-70X2W-XPW-005
Manufacturer: LEDTRONICS -
Luminaire: WITH CLEAR LENS,120VAC,147W,AL73 HOUSING,7X10,5.1A
Luminaire Cat: SLL003P-70X2W-XPW-005
Lamp: . LUMEN RATING: 7383.8Lms.
Lamp Output: 1 lamp(s), rated lamp lumens: 7383.8
Max Candela: 3,861.0 at Horizontal: 0, Vertical: 0
Luminous Opening: Point
Test: 8-24-09

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0-30	2,770.6	37.5%	37.5%
0-40	4,398.8	59.6%	59.6%
0-60	6,677.6	90.4%	90.4%
60-90	706.1	9.6%	9.6%
0-90	7,383.8	100%	100%
0-180	7,383.8	100%	100%

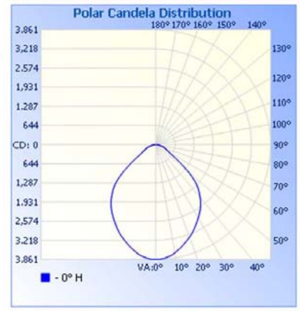
Total Efficiency: 100%

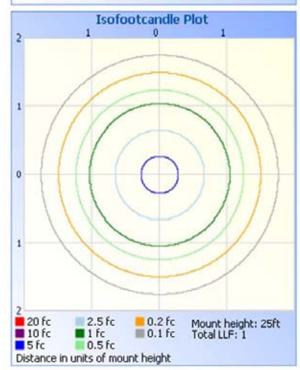
Illuminance at a Distance

	Center Beam FC	Beam Width	
4.2ft	222.39 fc	8.4ft	8.4ft
8.3ft	55.60 fc	16.7ft	16.7ft
12.5ft	24.71 fc	25.1ft	25.1ft
16.7ft	13.90 fc	33.5ft	33.5ft
20.8ft	8.90 fc	41.8ft	41.9ft
25.0ft	6.18 fc	50.2ft	50.2ft

Vert. Spread: 90.3° Horiz. Spread: 90.3°

25 FEET





Luminaire Photometric Report

Filename: SLL003P-70X2W-XPW-005
Manufacturer: LEDTRONICS -
Luminaire: WITH CLEAR LENS,120VAC,147W,AL73 HOUSING,7X10,5.1A
Luminaire Cat: SLL003P-70X2W-XPW-005
Lamp: . LUMEN RATING: 7383.8Lms.
Lamp Output: 1 lamp(s), rated lamp lumens: 7383.8
Max Candela: 3,861.0 at Horizontal: 0, Vertical: 0
Luminous Opening: Point
Test: 8-24-09

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0-30	2,770.6	37.5%	37.5%
0-40	4,398.8	59.6%	59.6%
0-60	6,677.6	90.4%	90.4%
60-90	706.1	9.6%	9.6%
0-90	7,383.8	100%	100%
0-180	7,383.8	100%	100%

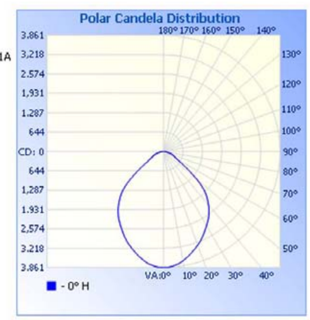
Total Efficiency: 100%

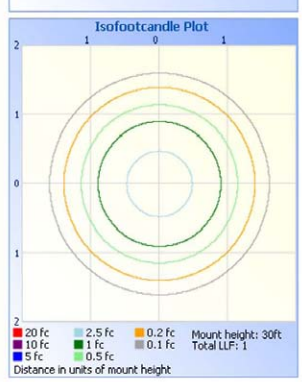
Illuminance at a Distance

	Center Beam FC	Beam Width	
5.0ft	154.44 fc	10.0ft	10.0ft
10.0ft	38.61 fc	20.1ft	20.1ft
15.0ft	17.16 fc	30.1ft	30.1ft
20.0ft	9.65 fc	40.2ft	40.2ft
25.0ft	6.18 fc	50.2ft	50.2ft
30.0ft	4.29 fc	60.3ft	60.3ft

Vert. Spread: 90.3° Horiz. Spread: 90.3°

30 FEET





Ideal for Use with Alternate or Renewable Energy Resources – Solar & Wind Power

TEST RESULTS ARE PRELIMINARY — FINALIZED RESULTS UPCOMING

DESCRIPTION

The Lumark WAL-LITE features a injection-molded polycarbonate housing/lens and a die-cast aluminum back plate for rugged durability. UL listed for wet locations. CSA certified. WAL-LITE can be mounted to any vertical surface, and delivers excellent beam control for areas such as offices, homes, storage facilities and service areas.

Catalog #		Type
Project		
Comments		Date
Prepared by		

SPECIFICATION FEATURES

Construction
HOUSING: Injection-molded polycarbonate housing. Standard color bronze. Optional white finish available on some models. GASKETING: Housing is sealed and gasketed.

Electrical
SOCKET: HID: 4Kv medium 3PSE socket CONDUIT ENTRY: HID: 1/2" NPS conduit tap for applications where external wiring is desired.

Optical
LAMP: HID: High Pressure Sodium up to 70W, lamp included. OPTICAL SYSTEM: Aluminum reflector and prismatic refractor directs light down and out, reducing glare and wasted light.

Mounting
MOUNTING PLATE: Die-cast aluminum back plate. MOUNTING OPTIONS: Can be mounted to any vertical surface.

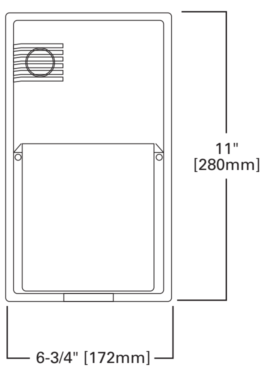
WM
WAL-LITE

50 - 70W

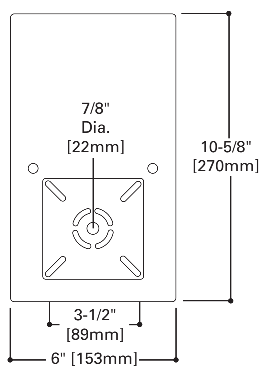
High Pressure Sodium

COMPACT WALL MOUNT LUMINAIRE

FRONT DIMENSIONS



MOUNTING DIMENSIONS



TECHNICAL DATA

UL Wet Location Listed
CSA Certified

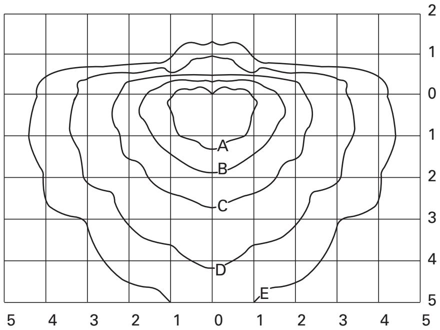
ENERGY DATA

Reactor Ballast Input Watts
50W HPS NPF (58 Watts)
70W HPS NPF (82 Watts)

SHIPPING DATA

Approximate Net Weight:
HID: 7 lbs. (3 kgs.)

PHOTOMETRICS



HPWM70
70-Watt High Pressure Sodium
6,300-Lumen Clear Lamp

Footcandle Table

Select mounting height and read across for footcandle values of each isofootcandle line. Distance in units of mounting height.

Mounting Height	Footcandle Values for Isofootcandle Lines				
	A	**B**	**C**	**D**	**E**
8'	1.28	0.64	0.32	0.12	0.06
10'	2.00	1.00	0.50	0.20	0.10
15'	4.50	2.25	1.12	0.45	0.22

LAMP TYPE	WATTAGE
High Pressure Sodium (HP)	50, 70W

STOCKING SAMPLE NUMBER (LAMP INCLUDED)

SAMPLE NUMBER: HPWM70

Lamp Type
HP

Series Type
WM

Lamp Wattage[1]
50P with 120V Photocontrol
70P with 120V Photocontrol
70

Notes:
[1] 50, 70 Watt fixtures are 120V

NOTE: Specifications and dimensions subject to change without notice.

PERIMALITER® WALLPACK
PVL3 POLYCARBONATE SERIES

Cat. #		Approvals
Job	Type	

HUBBELL®
Outdoor Lighting

APPLICATIONS

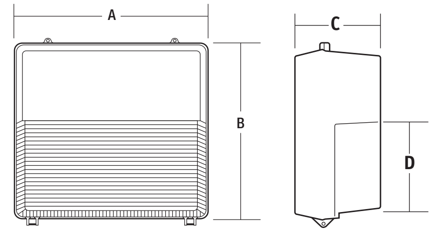
- Ideally suited for security lighting applications as well as commercial and architectural exterior wall and area lighting for parking lots, office buildings, stores, shopping centers, fast food restaurants, banks, warehouses, and parking garages.

SPECIFICATIONS

- One-piece polycarbonate front with high performance prismatic optics. Secures to housing gasket with twin Hubbell Gard® captive fasteners.
- Die cast aluminum housing allows firm mounting over recessed junction boxes or on flat surfaces for 1/2" surface conduit. Casting dissipates ballast heat for long life. Top hub supplied for field installation of button photocontrol, ordered separately.
- Specular aluminum reflector with kicker panels drive maximum lamp lumens to the refractor prisms. Vertical medium base lamp with these optics provide six-to-one spacing-to-mounting height ratio for maximum spacing or better uniformity. Vertical lamp increases both lamp life and output.
- Available in 70-150 watt HPS and 70-150 watt pulse start metal halide. Various combinations of 120V NPF (HPS only) and QuadTap®, HPF ballasts. 347 volt for Canada and 50 Hz 220/240 volt available. Many listings include medium base lamp for stocking convenience.
- Dark bronze powder paint finish standard on housing, front is painted inside the polycarbonate for lasting appearance.

LISTINGS

- CSA certified to UL 1598 for use in wet locations.



A	B	C	D
14 7/8"	15"	8"	7 7/16"
378 mm	381 mm	203 mm	189 mm

ORDERING INFORMATION

ORDERING EXAMPLE: PVL3-150P-18-BZ-L

[ ] - [ ] [ ] - [ ] [ ] - [ ] - [ ]

Series Wattage Source Ballast Voltage Finish Options

Catalog Number	Wattage	Source	Voltage	Ballast	Lamp Included	Weight lbs.	Weight kg
		PULSE START METAL HALIDE					
PVL3-070P-18-BZ-L	70	PS	Quad Tap	HX-HPF	Yes	24	10.9
PVL3-100P-18-BZ-L	100	PS	Quad Tap	HX-HPF	Yes	25	11.3
PVL3-150P-18-BZ-L	150	PS	Quad Tap	HX-HPF	Yes	25	11.3
		HIGH PRESSURE SODIUM					
PVL3-070S-18-BZ	70	HPS	Quad Tap	AL-HPF	No	23	10.4
PVL3-070S-18-BZ-L	70	HPS	Quad Tap	AL-HPF	Yes	23	10.4
PVL3-100S-18-BZ	100	HPS	Quad Tap	AL-HPF	No	24	10.9
PVL3-100S-18-BZ-L	100	HPS	Quad Tap	AL-HPF	Yes	24	10.9
PVL3-150S-18-BZ	150	HPS	Quad Tap	AL-HPF	Yes	25	11.3
PVL3-150S-18-BZ-L	150	HPS	Quad Tap	AL-HPF	Yes	25	11.3
PVL3-150S-51-BZ-L	150	HPS	120NPF	HX-HPF	Yes	12	5.4

L Indicates lamp included with the fixture. All units have medium base sockets.
Above units (-18) are Quad Tap (120,208,240,277V. 480V available on 150w units change 8 to 5.
For TriTap Canadian ballast (120,277,347V) change 8 to 6.
All units are provided in BZ - dark bronze finish
50HZ ballastry is available - Consult factory

ACCESSORIES (order as separate part #)

Catalog Number	Description
PBT-1	Photocontrol, 120V
PBT-234	Photocontrol, 208, 240, 277V
PVL3V	Full Cutoff Visor, formed aluminum, bronze finish

OPTIONS (factory installed, add appropriate suffix)

Catalog Number	Description
-EM	Double Contact Socket for remote power (less lamp) all units
-QSS	Quartz Restrike System including relay (less lamp) all units (double contact bayonet socket)
-RS	Hot Restrike System, quickly restores main lamp output after power outage (HPS only)
-L	Lamp included with fixture

PHOTOMETRIC REPORTS

Catalog Number	Report #
PVL3-150S-XX-XX	**HP01146.IES**
PVL3-150P-XX-XX	**HP02412.IES**

Due to our continued efforts to improve our products, product specifications are subject to change without notice.

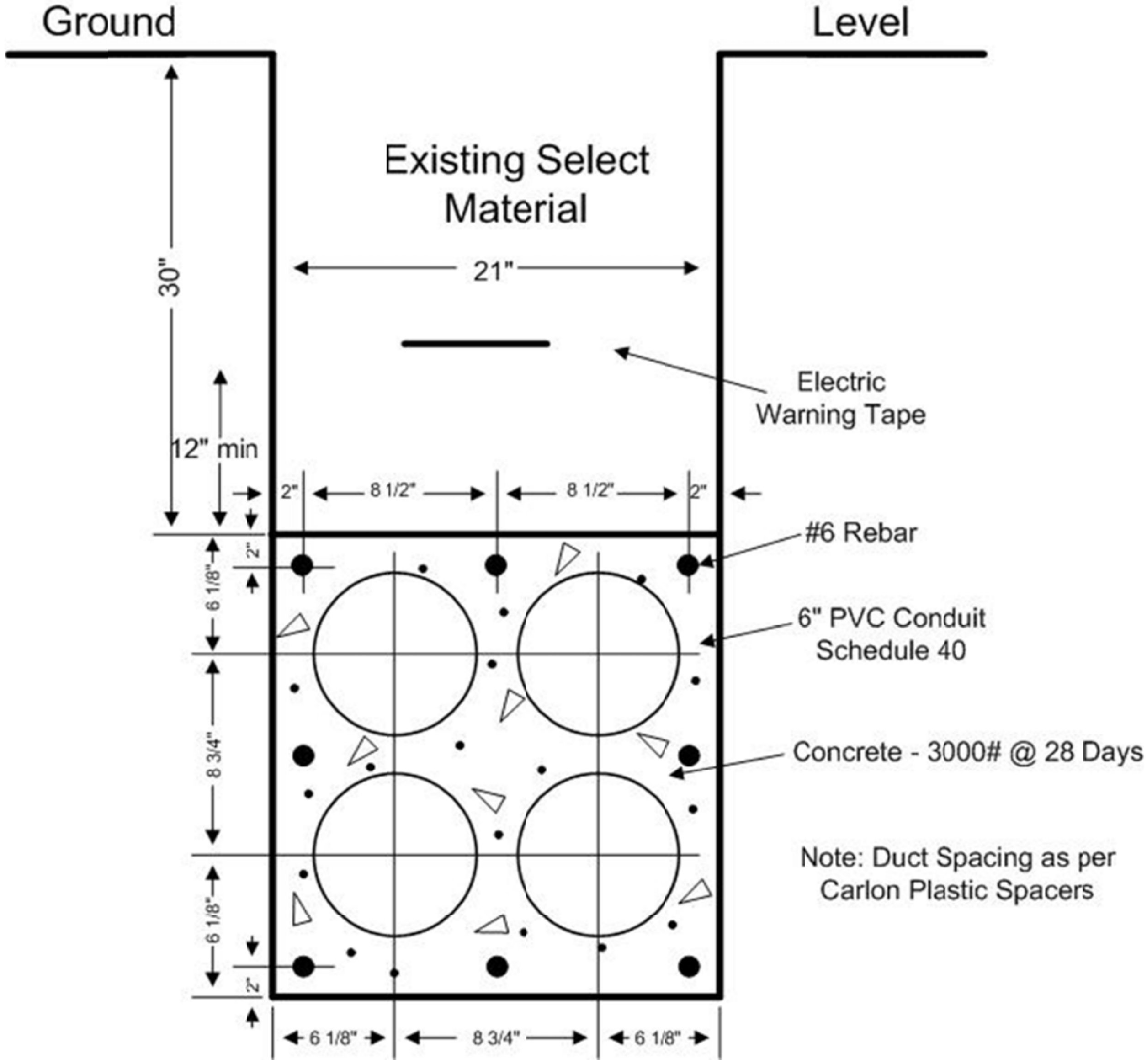
HUBBELL®
Outdoor Lighting

Hubbell Outdoor Lighting • 701 Millennium Boulevard • Greenville, SC 29607 • PHONE: 864-678-1000
For more information visit our web site: **www.hubbell-ltg.com**

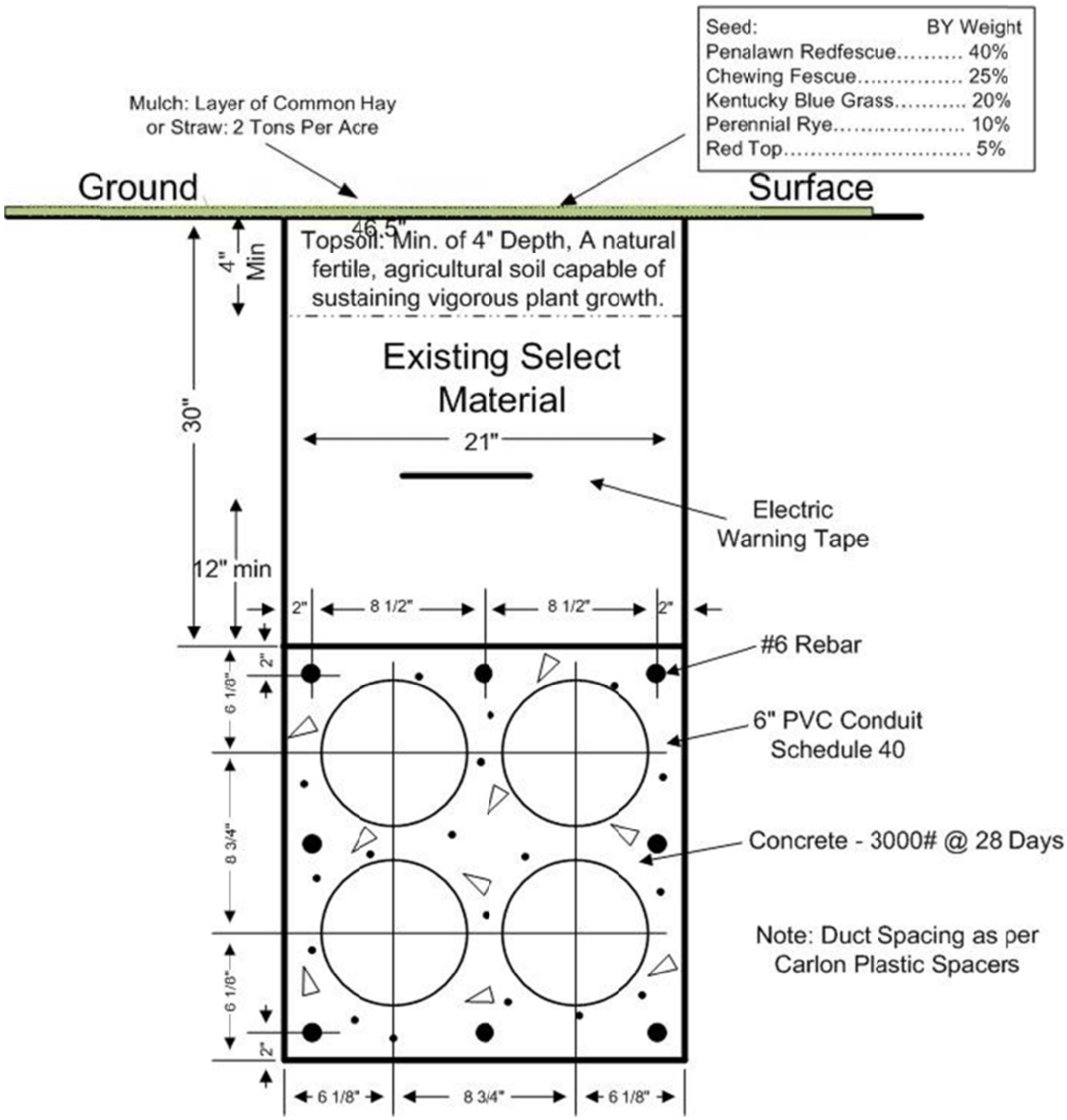
APPENDIX C2

Trench Restoration Details

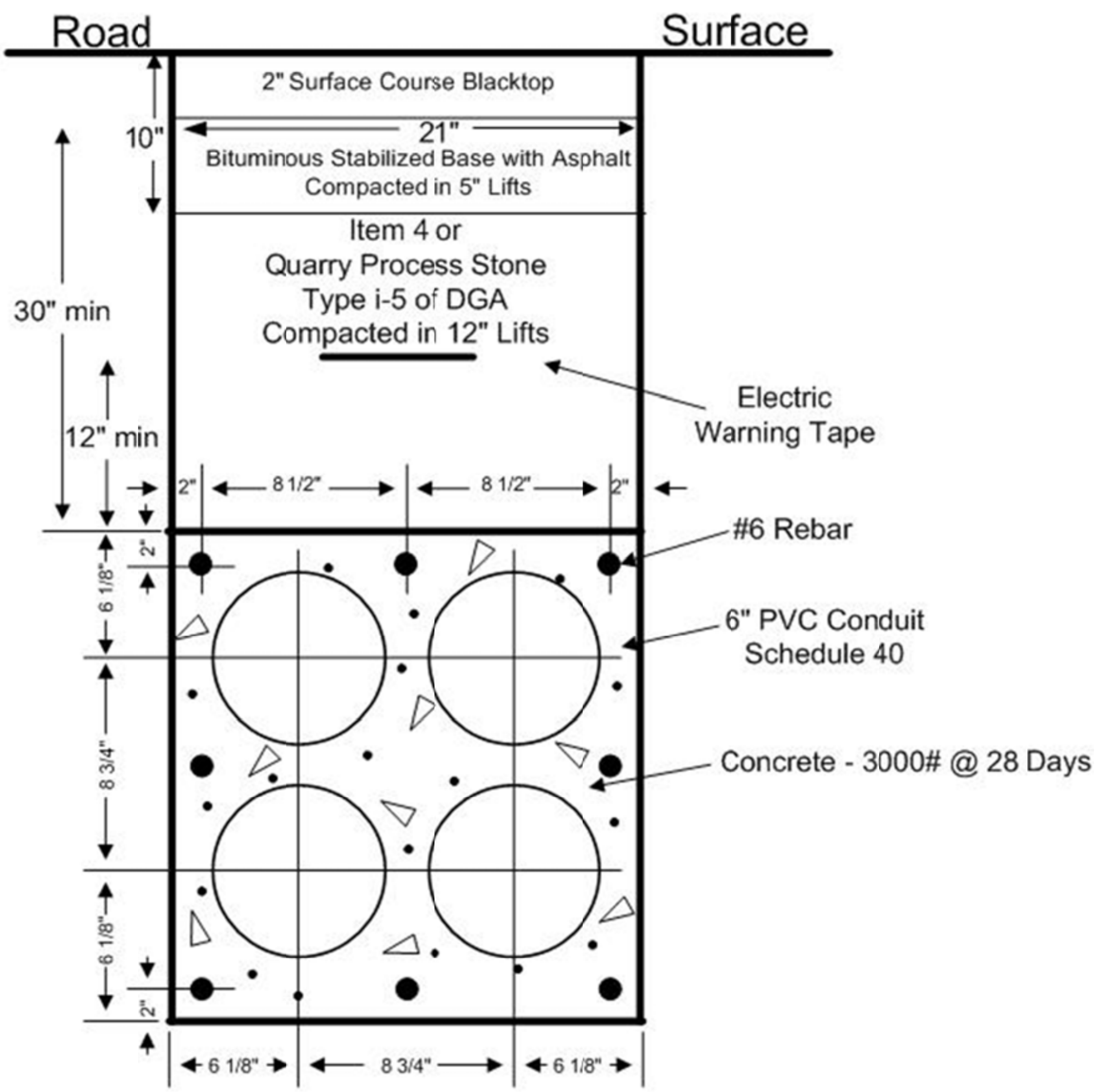
Typical 4 - 6" Concrete Encased Duct Arrangement for Behind the Curb Construction



Typical 4 - 6" Concrete Encased Duct Arrangement for Behind the Curb Construction in Grass Area



Typical 4- 6" Concrete Encased Duct Arrangement for Local Road



Notes:
Duct Spacing as per
Carlon Plastic Spacers

All cut edges of pavement must be sealed with Asphalt Filler
(702-0700)

APPENDIX D
Flora Survey

APPENDIX E
CMX Tree Survey Data

APPENDIX F
Endangered, Threatened, Rare Species Screening Correspondence

APPENDIX G
Phase I Habitat Survey for Bog Turtle

APPENDIX H
Phase II Bog Turtle Surveys

APPENDIX I
Indiana Bat Habitat Assessment

APPENDIX J
USACE and NYSDEC Wetland Correspondence

APPENDIX K
Stormwater Pollution Prevention Plan (SWPPP)

CMX

STORMWATER POLLUTION PREVENTION PLAN

FOR

HARTLEY ROAD SUBSTATION
GOSHEN, NY

PREPARED FOR

ORANGE AND ROCKLAND UTILITIES, INC
1 BLUE HILL PLAZA
PEARL RIVER, NY 10965

W. Charles Utschig, Jr., PE
N.Y.S. Lic. No. 62303

570312000100
August, 2011

HARTLEY ROAD SUBSTATION

TOWN OF GOSHEN

Orange County, New York

Table of Contents

Section No.

1

1358331598

NOTICE OF INTENT

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

NYR
(for DEC use only)

Stormwater Discharges Associated with Construction Activity Under State Pollutant Discharge Elimination System (SPDES) General Permit # GP-0-10-001

All sections must be completed unless otherwise noted. Failure to complete all items may result in this form being returned to you, thereby delaying your coverage under this General Permit. Applicants must read and understand the conditions of the permit and prepare a Stormwater Pollution Prevention Plan prior to submitting this NOI. Applicants are responsible for identifying and obtaining other DEC permits that may be required.

-IMPORTANT-
RETURN THIS FORM TO THE ADDRESS ABOVE
OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)
ORANGE AND ROCKLAND UTILITIES, INC

Owner/Operator Contact Person Last Name (NOT CONSULTANT)
COFFEY

Owner/Operator Contact Person First Name
JOHN

Owner/Operator Mailing Address
1 BLUE HILL PLAZA

City
PEARL RIVER

State
NY

Zip
10965 -

Phone (Owner/Operator)
845-577-3700

Fax (Owner/Operator)
845-577-3720

Email (Owner/Operator)
COFFEYJO@ORU.COM

FED TAX ID
 - (not required for individuals)

1863331599

Project Site Information

Project/Site Name

HARTLEY ROAD SUBSTATION

Street Address (NOT P.O. BOX)

HARTLEY ROAD

Side of Street

○ North ○ South ● East ○ West

City/Town/Village (THAT ISSUES BUILDING PERMIT)

TOWN OF GOSHEN

State: NY

Zip: 10924 -

County: ORANGE

DEC Region: 3

Name of Nearest Cross Street

Cheechunk Road

Distance to Nearest Cross Street (Feet)

10

Project In Relation to Cross Street

○ North ● South ○ East ○ West

Tax Map Numbers Section-Block-Parcel

Tax Map Numbers

1. Provide the Geographic Coordinates for the project site in NYTM Units. To do this you **must** go to the NYSDEC Stormwater Interactive Map on the DEC website at:

www.dec.ny.gov/imsmaps/stormwater/viewer.htm

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located your project site, go to the tool boxes on the top and choose "i"(identify). Then click on the center of your site and a new window containing the X, Y coordinates in UTM will pop up. Transcribe these coordinates into the boxes below. For problems with the interactive map use the help function.

X Coordinates (Easting)	Y Coordinates (Northing)
525254	4584574

2. What is the nature of this construction project?

● **New Construction**

○ **Redevelopment with increase in imperviousness**

○ **Redevelopment with no increase in imperviousness**

3. Select the predominant land use for both pre and post development conditions.
SELECT ONLY ONE CHOICE FOR EACH

Pre-Development Existing Land Use

- ○ FOREST
- ● PASTURE/OPEN LAND
- ○ CULTIVATED LAND
- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ○ COMMERCIAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY
- ○ PARKING LOT
- ○ OTHER [ ]

Post-Development Future Land Use

- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION — Number of Lots [ ]
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ○ COMMERCIAL
- ○ MUNICIPAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY (water, sewer, gas, etc.)
- ○ PARKING LOT
- ○ CLEARING/GRADING ONLY
- ○ DEMOLITION, NO REDEVELOPMENT
- ○ WELL DRILLING ACTIVITY *(Oil, Gas, etc.)
- ● OTHER: ELEC SUBSTATION

*note: for gas well drilling, non-high volume hydraulic fractured wells only

4. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law ? ○ **Yes** ● **No**

5. Is this a project which does not require coverage under the General Permit (e.g. Project done under an Individual SPDES Permit, or department approved remediation)? ○ **Yes** ● **No**

6. Is this property owned by a state authority, state agency, federal government or local government? ○ **Yes** ● **No**

7. In accordance with the larger common plan of development or sale, enter the total project site acreage, the acreage to be disturbed and the future impervious area (acreage)within the disturbed area. Round to the nearest tenth of an acre.

Total Site Acreage	Acreage To Be Disturbed	Existing Impervious Area Within Disturbed	Future Impervious Area Within Disturbed
7.4 *	7.3 **	0.2 ***	1.2 ***

8. Do you plan to disturb more than 5 acres of soil at any one time? ○ **Yes** ● **No**

9. Indicate the percentage of each Hydrologic Soil Group(HSG) at the site.

A	B	C	D
%	%	100 %	%

* Drainage area considered for SWPPP.
** (7.36 AC.) 0.74 AC of disturbance relates to trenching on paved roads.
*** (1.27 AC.)Trenched areas not included in impervious areas; not used for SWPPP preparation.

9155331591

10. Is this a phased project? ● Yes ○ No

11. Enter the planned start and end dates of the disturbance

Start Date: 1/02/2012 - End Date: 7/02/2013

12. Identify the nearest, natural, surface waterbody(ies) to which construction site runoff will discharge.

Name: CHEECHUNK CREEK

12a. Type of waterbody identified in Question 12?

- ○ Wetland / State Jurisdiction On Site (Answer 12b)
- ○ Wetland / State Jurisdiction Off Site
- ○ Wetland / Federal Jurisdiction On Site (Answer 12b)
- ○ Wetland / Federal Jurisdiction Off Site
- ○ Stream / Creek On Site
- ● Stream / Creek Off Site
- ○ River On Site
- ● River Off Site
- ○ Lake On Site
- ○ Lake Off Site
- ○ Other Type On Site
- ○ Other Type Off Site

12b. How was the wetland identified?

- ● Regulatory Map
- ○ Delineated by Consultant
- ○ Delineated by Army Corps of Engineers
- ○ Other (identify)

13. Has the surface waterbody(ies) in question 12 been identified as a 303(d) segment in Appendix E of GP-0-10-001? ○ Yes ● No

14. Is this project located in one of the Watersheds identified in Appendix C of GP-0-10-001? ○ Yes ● No

15. Is the project located in one of the watershed areas associated with AA and AA-S classified waters? **If no, skip question 16.** ○ Yes ● No

16. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey? **If Yes, what is the acreage to be disturbed?** ○ Yes ● No

[ ][ ][ ][ ].[ ]

17. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area? ○ Yes ● No

18. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)? ● Yes ○ No ○ Unknown

19. What is the name of the municipality/entity that owns the separate storm sewer system?

TOWN OF GOSHEN

20. Does any runoff from the site enter a sewer classified as a Combined Sewer? ○ Yes ● No ○ Unknown

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book) ? ● Yes ○ No

22. Does this construction activity require the development of a SWPPP that includes Water Quality and Quantity Control components (Post-Construction Stormwater Management Practices) **(If No, skip questions 23 and 27-35)** ● Yes ○ No

23. Have the Water Quality and Quantity Control components of the SWPPP been developed in comformance with the current NYS Stormwater Management Design Manual ? ● Yes ○ No

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:

- ● **Professional Engineer (P.E.)**
- ○ **Soil and Water Conservation District (SWCD)**
- ○ **Registered Landscape Architect (R.L.A)**
- ○ **Certified Professional in Erosion and Sediment Control (CPESC)**
- ○ **Owner/Operator**
- ○ **Other**

SWPPP Preparer
CMX/BSG

Contact Name (Last, Space, First)
UTSCHIG,W. CHARLES

Mailing Address
1311 MAMARONECK AVENUE SUITE 50

City
WHITE PLAINS

State
NY

Zip
10605-

Phone
914-686-1000

Fax
914-686-1222

Email
CUTSCHIG@BIRDSALL.COM

SWPPP Preparer Certification

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-10-001. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

First Name
W. CHARLES

MI

Last Name
UTSCHIG

Signature

Date
10/ /2011

25. Has a construction sequence schedule for the planned management practices been prepared? ● Yes ○ No

26. Select **all** of the erosion and sediment control practices that will be employed on the project site:

Temporary Structural

- ● Check Dams
- ○ Construction Road Stabilization
- ● Dust Control
- ○ Earth Dike
- ○ Level Spreader
- ● Perimeter Dike/Swale
- ○ Pipe Slope Drain
- ○ Portable Sediment Tank
- ○ Rock Dam
- ○ Sediment Basin
- ○ Sediment Traps
- ● Silt Fence
- ● Stabilized Construction Entrance
- ● Storm Drain Inlet Protection
- ○ Straw/Hay Bale Dike
- ○ Temporary Access Waterway Crossing
- ○ Temporary Stormdrain Diversion
- ● Temporary Swale
- ○ Turbidity Curtain
- ○ Water bars

Biotechnical

- ○ Brush Matting
- ○ Wattling

Vegetative Measures

- ○ Brush Matting
- ○ Dune Stabilization
- ○ Grassed Waterway
- ● Mulching
- ○ Protecting Vegetation
- ○ Recreation Area Improvement
- ● Seeding
- ○ Sodding
- ○ Straw/Hay Bale Dike
- ○ Streambank Protection
- ○ Temporary Swale
- ● Topsoiling
- ○ Vegetating Waterways

Permanent Structural

- ○ Debris Basin
- ○ Diversion
- ○ Grade Stabilization Structure
- ● Land Grading
- ○ Lined Waterway (Rock)
- ○ Paved Channel (Concrete)
- ○ Paved Flume
- ○ Retaining Wall
- ○ Riprap Slope Protection
- ● Rock Outlet Protection
- ○ Streambank Protection

Other

Water Quality and Quantity Control

Important: Completion of Questions 27-35 is not required if response to Question 22 is No.

Post-Construction Stormwater Management Practices

27. Indicate **all** Stormwater Management Practice(s) that will be installed/constructed on this site:

Ponds
- ○ Micropool Extended Detention (P-1)
- ○ Wet Pond (P-2)
- ○ Wet Extended Detention (P-3)
- ○ Multiple Pond System (P-4)
- ○ Pocket Pond (P-5)
- ● Dry Extended Detention Basin

Filtering
- ○ Surface Sand Filter (F-1)
- ○ Underground Sand Filter (F-2)
- ○ Perimeter Sand Filter (F-3)
- ○ Organic Filter (F-4)
- ● Bioretention (F-5)
- ○ Other

Alternative Practice
- ○ Rain Garden
- ○ Cistern
- ○ Green Roof
- ○ Stormwater Planters
- ○ Permeable Paving (Modular Block)

Wetlands
- ○ Shallow Wetland (W-1)
- ○ Extended Detention Wetland (W-2)
- ○ Pond/Wetland System (W-3)
- ○ Pocket Wetland (W-4)

Infiltration
- ○ Infiltration Trench (I-1)
- ○ Infiltration Basin (I-2)
- ○ Dry Well (I-3)
- ○ Underground Infiltration System

Open Channels
- ○ Dry Swale (O-1)
- ○ Wet Swale (O-2)

Verified Proprietary Practice
- ○ Hydrodynamic
- ○ Wet Vault
- ○ Media Filter

28. Describe other stormwater management practices not listed above or explain any deviations from the technical standards.

No channel protection is required as CPv release orifice was calculated to be less than 3" in diameter.

29. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed? ● Yes ○ No

If Yes, Identify the entity responsible for the long term Operation and Maintenance

ORANGE AND ROCKLAND UTILITIES, INC

30. Provide the total water quality volume required and the total provided for the site.

WQv Required 0.129 acre-feet

WQv Provided 0.145 acre-feet

31. Provide the following Unified Stormwater Sizing Criteria for the site.

Total Channel Protection Storage Volume (CPv) - Extended detention of post-developed 1 year, 24 hour storm event

CPv Required 0.0 acre-feet

CPv Provided 0.0 acre-feet

31a. The need to provide for channel protection has been waived because:

○ **Site discharges directly to fourth order stream or larger**

Total Overbank Flood Control Criteria (Qp) - Peak discharge rate for the 10 year storm

Pre-Development 17.01 **CFS**

Post-development 15.64 **CFS**

Total Extreme Flood Control Criteria (Qf) - Peak discharge rate for the 100 year storm

Pre-Development 29.00 **CFS**

Post-development 25.60 **CFS**

31b. The need to provide for flood control has been waived because:

○ **Site discharges directly to fourth order stream or larger**

○ **Downstream analysis reveals that flood control is not required**

IMPORTANT: For questions 31 and 32, impervious area should be calculated considering the project site and all offsite areas that drain to the post-construction stormwater management practice(s). (Total Drainage Area = Project Site + Offsite areas)

32. Pre-Construction Impervious Area - As a percent of the Total Drainage Area enter the percentage of the existing impervious areas before construction begins. 2 %

33. Post-Construction Impervious Area - As a percent of the Total Drainage Area, enter the percentage of the future impervious areas that will be created/remain on the site after completion of construction. 19 %

34. Indicate the total number of post-construction stormwater management practices to be installed/constructed. 2

35. Provide the total number of stormwater discharge points from the site. (include discharges to either surface waters or to separate storm sewer systems) 1

36. Identify other DEC permits that are required for this project.

DEC Permits

- ○ Air Pollution Control
- ○ Coastal Erosion
- ○ Hazardous Waste
- ○ Long Island Wells
- ○ Mined Land Reclamation
- ○ Other SPDES
- ○ Solid Waste
- ● None
- ○ Other
- ○ Navigable Waters Protection / Article 15
- ○ Water Quality Certificate
- ○ Dam Safety
- ○ Water Supply
- ○ Freshwater Wetlands/Article 24
- ○ Tidal Wetlands
- ○ Wild, Scenic and Recreational Rivers
- ○ Stream Bed or Bank Protection / Article 15

37. Does this project require a US Army Corps of Engineers Wetland Permit? ○ Yes ● No
If Yes, Indicate Size of Impact. [ ] . [ ]

38. Is this project subject to the requirements of a regulated, traditional land use control MS4? ○ Yes ● No
(If No, skip question 39)

39. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI? ○ Yes ● No

40. If this NOI is being submitted for the purpose of continuing coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned. NYR

Owner/Operator Certification

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) business days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction, and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Print First Name JOHN

MI

Print Last Name COFFEY

Owner/Operator Signature

Date / /

2

HARTLEY ROAD SUBSTATION

TOWN OF GOSHEN

Orange County, New York

Table of Contents

A. Introduction

This Stormwater Pollution Prevention Plan (SWPPP) report has been prepared as part of the permitting process for the construction of the Hartley Road Electrical Substation, located east of the intersection between Cheechunk Road and Hartley Road, in the Town of Goshen, Orange County, State of New York. The substation is proposed on a portion of an undeveloped, partially wooded/meadow parcel having a total area of 48.73 acres. This SWPPP is required by the New York State Department of Environmental Conservation (NYSDEC) pursuant to the Phase II regulations under General Permit GP-0-10-001 for more than one acre of disturbance; the disturbance area accounts for 7.36 ac, including an approximate 0.732 ac of disturbance from trenching activities along nearby local roads (Owens, Cheechunk and Hartley Roads).

This report and application shall hereafter refer to the "site" as the portions of land delineated by the limit of disturbance as shown on site plans prepared by CMX and attached herewith (section 7).

B. Site Description

The site consists primarily of MdB soils (C Soils); hydrologic groups based on NRCS. The site and additional offsite areas are analyzed in this report as one area labeled "Subarea 1" in the pre-development conditions and "Subarea 1A, 1B, 1C & 1D" in the post-development conditions.

The grading and drainage plans have been designed to capture and treat all of the stormwater runoff from all impervious surfaces on the site. Hydrologic characteristics for Subareas 1B & 1C are not expected to change significantly; as such, runoff from these areas were designed to bypass the proposed stormwater best management practices (BMPs) through the use of swales and culverts. Stormwater runoff for Subareas 1A and 1D will be collected through a series of field inlets, perimeter swales and a trench drain; this runoff will be directed towards the proposed BMPs: a bioretention area (NYSDEC F-5) and a dry extended detention basin.

Water quality for the proposed impervious surfaces has been provided by means of the bioretention area; flow control is provided by both the bioretention area and dry extended detention basin. Stormwater runoff rates for the 1, 10 (Overbank Protection), 25 and, 100-yr storm events have been analyzed and routed in the pre-development and post-development conditions utilizing computer software by Bentley (Haestad Methods), the design assumptions and results are attached herewith and made part of this report.

In the pre-development conditions, the site consists of one (1) drainage area (Subarea 1) generally formed by the existing topography and limited to the areas within the proposed disturbance; this area is undeveloped and drains towards an existing culvert through Hartley Road (southwest of the proposed substation); the location of this culvert is hereinafter referred to as the "Design Point".
In the post-development conditions, four (4) drainage areas (Subarea 1A, 1B, 1C & 1D) are considered. Subarea 1A consists of the areas directly related with the development of the substation and is mitigated by the proposed bioretention basin and dry extended detention basin. Subarea 1D is immediately adjacent to the bioretention basin and accounts for the proposed dry extended detention basin and a small contributing area. Subarea 1D is modeled separate from Subarea 1A as it is located downstream from the bioretention basin. All post-development subareas have similar drainage patterns and design point as in the pre-development conditions.

It is expected that construction will last 17 months from the time of ground breaking to final completion, with work commencing within 30 days following the receipt of all necessary approvals. Throughout the construction process strict adherence to the *Grading and Erosion Control Plan* and Specifications will be maintained to ensure all sediments are contained within the site.

C. Project Description

Proposed services, related studies and information for the electrical substation are as follows:

1. Sanitary Sewer:
   No sanitary sewer improvements are proposed.

2. Water Supply:
   No potable water supply improvements are proposed.

3. Floodplain Analysis:
   The FEMA floodplain map (attached herewith) does not show potential floodplains in the immediate vicinity of the site area.

4. Stormwater Management:
   The stormwater management plan has been implemented to provide quality of runoff (WQv), Runoff Reduction Volume (RRv) and flow control by means of the storage provided within the basins (bioretention area and dry extended detention); as such, the 1, 10, 25 and 100-yr storm events at the Design Point were reduced in the post-development conditions.

   Detailed Calculations and analysis of the pre-development and post-development rates of runoff for the project are included in this report.

   Stormwater Quantity:
   A detailed analysis of the pre and post-development peak rates of runoff for the 1, 10, 25 and 100 year 24-hour storm events have been included in this report.

   Stormwater Quality (WQv):
   The project will reduce the pollutants carried by stormwater runoff; this has been accomplished through the use of filtering practices per NYSDEC: Bioretention Area (F-5).

   Runoff Retention Volume (RRv):
   In accordance with the new sizing criteria for Chapter 3 of the *New York State Stormwater Management Design Manual*, the provision of Runoff Reduction Volume (RRv) is required for this development. This RRv shall be equal or greater than the required water quality volume (WQv) and be provided through the use of green infrastructure (GI) practices; the following is proposed to meet such requirements:

   - Calculated WQv: 5,626 cf
   - Selected GI Practice: Bioretention basin (NYSDEC F-5) with underdrains
   - Soil HSG: C
   - RRv capacity: 40%
   - Total bioretention basin volume: 15,750 cf
   - Total RRv provided: 6,300 cf

   Please refer to section 9 of this SWPPP for further information.

   Maintenance of Temporary and Permanent Structures and Practices:
   Temporary and permanent erosion controls measures will be maintained and inspected in accordance with the NYSDEC general permit.

   All proposed soil erosion and sediment control practices are designed in accordance with the following publications:

- New York State Standards and Specifications for Erosion and Sediment Control, August 2005, latest edition.
- New York State Guidelines for Urban Erosion and Sediment Control, latest edition,
- New York State General Permit for Stormwater Discharges,
- "Reducing the Impacts of Stormwater Runoff from New Development", as published by the New York State Department of Environmental Conservation (NYSDEC), second edition, April 1993.

The proposed soil erosion and sediment control devices include: protective earthmoving procedures and grading practices, soil stabilization, check dams, and silt fencing. The approach of the plan is to control sedimentation, and re-establish vegetation as soon as practicable.

Additionally, the contractor shall adhere to the recommended material stockpile locations and staging area as shown on the ***Grading and Erosion Control Plan*** prepared by CMX and attached herewith. The plan will be implemented prior to commencement of earthmoving activities.

D. Required Permits and Approvals

- Municipal approval.

E. Stormwater Management Methodology (Five-Step Process)

Stormwater management computations provided in this report are based upon the Soil Conservation Service (SCS) TR-20 and TR-55 methodologies. The stormwater management design is based on the NYSDEC 'New York State Stormwater Management Design Manual', latest edition and 'Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMP'S, by the Metropolitan Washington Council of Governments. Pre and post development rates of storm water runoff have been computed for comparison for the 1, 10, 25 and 100-year storms events.

Stormwater quality has been analyzed in accordance with the guidelines set forth in the New York State General Permit for Storm Water Discharge, GP-0-10-001. Calculations for the water quality are included in section 9 of this report.

In accordance with the "Five Step Process for Stormwater Site Planning and Practice Selection" (Chapter 3 of the *New York State Stormwater Management Design Manual)*, following are the criteria implemented in the development of this SWPPP:

Step 1: Site Planning

Preservation of Natural Resources:

The substation and related improvements are proposed on a parcel having 48.73 acres in area; only 6.62 acres of this parcel are proposed to be disturbed (+/-13.6% of the total parcel area) with 1.27 acres resulting as permanent impervious areas; 42.11 acres will remain undisturbed. Of this undisturbed area, ORU proposes the implementation of a conservation easement having a total area of 28.74 acres or 59% of the total parcel area (previously approved by the NYS Public Services Commission); this area is delineated on the site plans prepared by CMX/ORU and made part of this report.

Further consideration for the proposed substation (and related improvements) included: *preservation of wetland areas/water resources* (entire substation was designed outside of wetlands areas; a small temporary disturbance is proposed for the construction of two steel mono-poles); *locating development in less sensitive areas* (majority of the disturbed areas are proposed outside of tree lines); *reduction of clearing and grading* (majority of the disturbed areas are proposed on flatter terrain consisting mostly of grasslands).

Reduction of Impervious Cover:
Switchgear, electrical equipment and related machinery within the substation will rest on a gravel bed; no sidewalk is proposed for this development and minimum parking area is proposed for maintenance vehicles.

Step 2: Determine Water Quality Treatment Volume (WQv)
Water quality volume has been calculated for the proposed impervious areas in accordance with Chapter 4 of the "manual"; numerical values are provided herewith in section 9 of this report.

Upon the implementation of the RRv design criteria, the proposed stormwater management practice will ultimately provide a much larger water quality volume than required. This is the result of over-sizing the filter volume in the bioretention area to account for the low "RRv capacity" of the proposed green practice i.e. bioretention in C soils has 40% RRv capacity.

Step 3: Runoff Reduction by Applying Green Infrastructure Techniques and Standard SMPs with RRv Capacity
Water quality and runoff reduction volumes have been provided entirely within the proposed bioretention area.

Step 4: Apply Standard Stormwater Management Practices to Address Remaining Water Quality Volume
No additional practice is proposed to address water quality or runoff reduction volumes; the proposed extended detention basin serves as a flow control practice exclusively.

Step 5: Apply Volume and Peak Rate Control Practices if Still Needed to Meet Requirements
Quantity control requirements were addressed by both the bioretention area (i.e. the storage above the filter area) and the dry extended detention basin. Pre and post development rates of storm water runoff have been computed for comparison for the 1, 10, 25 and 100-year storms events; all rates of runoff were reduced in the post development condition (see section 5 and 6 of this report).

F. Stormwater Rate of Runoff Analysis

Modeling of the rate of storm water runoff has been performed for the pre and post-development conditions. For both conditions, the peak rates of runoff have been calculated for the 1, 10, 25 and 100-year storm events, the results are provided in **Table 1.** Detailed routing computations are provided in this report in sections 5 and 6.

The following publications have been used in developing the Stormwater Runoff Calculations:

- Computer software entitled "PondPack". This program is based on USDA Soil Conservation Service (SCS) Technical Release 55 (TR 55) Urban Hydrology for Small Watersheds (2nd edition) June 1986.
- "Stormwater Collection Systems Design Handbook" by Larry W. Mays
- "Hydraulic Analysis and Design" Second Edition by Richard H. McCuen
- "Handbook of Hydraulics" Seventh Edition by Ernest F. Brater, Horace W. King, James E. Lindell, C.Y. Wei

Table 1 (Peak Runoff Discharge)

Design Point

Design Storm (YR)	Pre Development Peak Runoff (cfs)	Post Development Peak Runoff (cfs)
1	5.52	4.12
10	17.01	15.64
25	21.77	19.36
100	29.00	25.60

G. Construction Phasing Plan and Stormwater Management Facilities Maintenance Program

Because of the size of the proposed disturbance (7.35 ac.), two (2) phases of construction shall be implemented in the following order:

Phase 1(3.97 ac.):

This phase accounts for the vegetation/tree removal and grading activities related with the construction of the gravel access road, bioretention area, dry extended detention area, temporary and permanent wetland disturbances and the removal of an existing tower; maintenance program for this phase is as follows:

- Erosion and Sediment Control (ESC) measures implementation,
  - Install hay bales (as needed).
  - Provide tree protection.
- Tree removal,
- Clearing and grubbing within LOD,
  - Install silt fences
  - Construct stabilized construction entrance for the site
  - Construct diversion temporary swales and install check dams
  - Construct temporary sediment basin and install riser (rough-graded dry extended detention basin shall be used as a temporary sedimentation basin)
- Excavation and rough grading of proposed driveway and areas within LOD
  - Establish topsoil stockpiles as shown on ***Grading and Erosion Control Plan***
  - Install silt fences around the stockpiles and temporarily stabilize the stockpiles with tarp or mulch or temporary seeding
  - Disturbed areas where construction will cease for more than 14 days will be stabilized with erosion controls, such as hydro-seeding, hydro-mulch, or hay.
- Utility installation
  - Construct combined staging and materials storage area as shown on the ***Grading and Erosion Control Plans***
  - Install temporary sanitary facilities (portasans, etc.)
  - Install dumpsters for the site

Phase 2 (4.87 ac.):

This phase accounts for the disturbed areas directly related with the construction of the proposed substation, including but not limited to: paved access driveway, concrete pads for towers, gravel areas near towers, land grading activities, electrical distribution installation (both within and along local roads), transmission line connection, stormwater management practices and earth berm; maintenance program for this phase is as follows:

- Erosion and Sediment Control (ESC) measures implementation,
  - Install hay bales (as needed).
  - Provide tree protection.
- Clearing and grubbing within LOD,
- Restore and re-seed any eroded areas as soon as possible.
- Construct earth berm (see grading plans)
- Rough access driveway construction
  - Prepare driveway subgrade and install storm drain inlets (FI) and trench drains
  - Install inlet protection as indicated on *Details Plans*
  - Allocation of concrete washout areas (provided by operator)
  - Construction waste shall be stored in dumpsters and carried off-site on a regular basis
- Final stabilization of disturbed areas,
  - Remove BMPs from storm drain inlets and finalize pavement activities
  - Remove temporary concrete washout areas and restore to original grade
  - Remove all ESC measures upon approval of design engineer and/or ESC inspector.

Awarded contractor shall be responsible for the proper implementation of the ESC practices. The following maintenance program is proposed in order to maintain the proper function of all drainage and erosion and sediment control facilities:

- Inspect bioretention area and if necessary remove accumulated sedimentation and debris; at no point should the filter bed be allowed to continue operations beyond 50% of its capacity being compromised by debris (three inches from bottom).
- Vegetation height limited to 12" and shall be mowed a minimum of 3 times per growing season.
- Re-mulch bioretention filter area annually.
- If water ponds on the filter bed for a period greater than 48 hours, remove and replace all filter media.
- All disturbed areas will be stabilized and the sediment build-up in the filter removed. After the construction is completed, any areas disturbed shall be stabilized immediately after the required work is completed.
- During construction, erosion and sediment controls must be inspected by a qualified professional every seven days. The Owner shall inspect the facilities once a month. A report by the Professional Engineer shall be submitted to the Owner and the Town of Goshen in the event deficiencies are found. In addition, the Owner shall inspect the systems after each major storm event to ensure the inlets remain open. Specific attention should be paid to the following:
  - Evidence of clogging in inlets, pipes, and end sections,
  - Erosion of the flow path through the temporary swales,
  - Accumulation of sediment (in both the bioretention area and dry extended detention basin)
- All sediment removal and/or repairs will be followed *immediately* by re-vegetation.
- Maintenance and inspection checklists (as per NYSDEC) are attached herewith in section 10 of this plan. (Completed forms shall be kept on site at all times and made available to authorities upon request.)
- Clean inlets and other drainage structures from silt regularly, but not less than twice a year. Remove sediment build up in the bioretention area and dry detention basin as required, but a minimum of every five years.
- Restore and re-seed any eroded areas as soon as possible.

In accordance with the *New York State Stormwater Management Design Manual* section 3.5: "[...the] owner of a post-construction stormwater management practice, including the runoff reduction practices and SMPs included in this Design Manual, shall erect or post, in the immediate vicinity of the stormwater management practice, a conspicuous and legible sign of not less than 18 inches by 24 inches [...] bearing the following information:"

> **STORMWATER MANAGEMENT PRACTICE** – *(name of the practice)*
> **Project Identification** – *(SPDES Construction Permit #, other)*
> **Must be maintained In Accordance with O&M Plan**
> **DO NOT REMOVE OR ALTER**

The Stormwater Management Facilities Maintenance Program will be managed by the owner during construction and eventually by Orange & Rockland Utilities, Inc. The contact person is John Coffey and the 24-hour contact number is (845) 577-3700.

H. Material Handling and Waste Management

Operator shall be responsible for all waste materials being collected and disposed of into one (1) metal trash dumpster located in the combined staging area as shown on the site plans. Dumpster shall have a secure watertight lid, be placed away from stormwater conveyances and drains, and meet all local and state solid-waste management regulations. Only trash and construction debris from the site will be deposited in the dumpster.

Operator shall not store erodible or hazardous materials on any roadway. Oil and machinery fuels shall be kept to a necessary minimum and stored in structurally sound and sealed shipping containers in hazardous-material storage area segregated from other non-waste materials. All hazardous materials will be disposed of in accordance with federal, state, and municipal regulations.

Operator shall be responsible for maintaining the cleanliness of the streets (driveways/parking and adjacent areas) and storm drain inlet protection (as applicable) Best Management Practices (BMPs) throughout the construction project.

Operator shall provide adequate designated concrete washout areas throughout the construction project and will be responsible for proper disposal of the concrete, mortar or grout collected there.

One (1) temporary sanitary facility (portable toilet) shall be provided at the site in the combined staging area. The toilet shall be away from a concentrated flow path and traffic flow and shall have collection pans underneath as secondary containment.

Wood pallets, cardboard boxes, and other recyclable construction scraps will be disposed of in a designated dumpster for recycling. Construction equipment and maintenance materials shall be stored at the combined staging area.

All spills shall be cleaned up immediately upon discovery. Spent absorbent materials and rags will be hauled off-site immediately after the spill is cleaned up for disposal. Spills large enough to discharge to surface water will be reported to the National Response Center at 1-800-424-8802. Material safety data sheets, a material inventory, and emergency contact information will be maintained on site.

I. Narrative Report

The primary goal of the soil erosion and sediment control measures is to reduce soil erosion from areas stripped of vegetation during and after construction, and to prevent discharge of silt offsite. Erosion control barriers shall be placed around exposed areas during construction. The barriers shall consist of silt fence, or silt fence backed by hay bales

Any areas stripped of vegetation during construction will be left bare for the shortest time possible. Any topsoil removed during construction will be temporarily stockpiled for future use in grading and landscaping. Stockpile locations have been provided on the Erosion and Sediment Control Plan and shall be contained within a silt fence/hay bale barrier.

Temporary vegetation will be established to protect exposed soil areas during construction. If growing conditions are not suitable for the temporary vegetation, mulch will be used. Materials that may be used for mulching include; straw, hay, salt hay, wood fiber, synthetic soil stabilizers, mulch netting, and sod. A permanent vegetative cover will be established upon completion of construction of those areas that have been brought to finish grade and to remain undisturbed.

The dry extended detention basin area shall be used as a temporary sedimentation basin. A temporary riser shall be installed prior to and maintained during construction activities; riser to be removed upon completion of construction activities.

A temporary stabilized construction entrance comprised of three inches clean stone will be constructed at the entrances to the site. The purpose of a stabilized entrance is to remove as much soil from the construction vehicle tires prior to exiting the site and traveling on the existing roadways. During construction, inlet protection (as applicable) will be installed at each storm sewer inlet to minimize the conveyance of silt and sediment through the storm sewer system.

If the contractor encounters ground water during the excavation of the areas for the filter media, he shall notify the design engineer immediately. The contractor shall store all excavated material at the designated location show on the ***Erosion Sediment Control and Construction Phasing Plan*** with the appropriate erosion control measures corresponding to the stockpile detail.

J. Final Stabilization

Permanent seeding shall be applied immediately after the final design grades are achieved as applicable throughout the site but no later than fourteen (14) days after construction activities have ceased. After stabilization, accumulated sediment shall be removed from site for disposal along with construction debris, trash and temporary BMPs e.g. silt fences, straw bales, material storage areas, sanitary toilets, etc.

Seedbed preparation/grass application
A minimum depth of 2 to 6 inches shall be applied on areas where disturbance results in subsoil being the final grade surface. The seedbed shall be free of large clods, rocks, woody debris and other intrusive materials; fertilizer shall be applied accordingly.
Seeding schedule and application procedure notes are shown on the *Grading and Erosion Control Plans* attached herewith.

K. Conclusion:

The implementation of this stormwater pollution prevention plan will not adversely affect the existing drainage system along the downstream channel. The pre-development rates of runoff have been reduced in the developed condition, stormwater runoff treated and runoff reduction volume (RRv) provided in conformance with New York State Department of Environmental Conservation Phase II regulations.

Respectfully Submitted,

W. Charles Utschig, Jr., PE
N.Y.S. Lic. No. 62303
CMX

Soil Map—Orange County, New York
(Soils Maps)

USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:3,710 if printed on B size (11" × 17") sheet.

The soil surveys that comprise your AOI were mapped at 1:15,840.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County, New York
Survey Area Data: Version 10, Feb 5, 2010

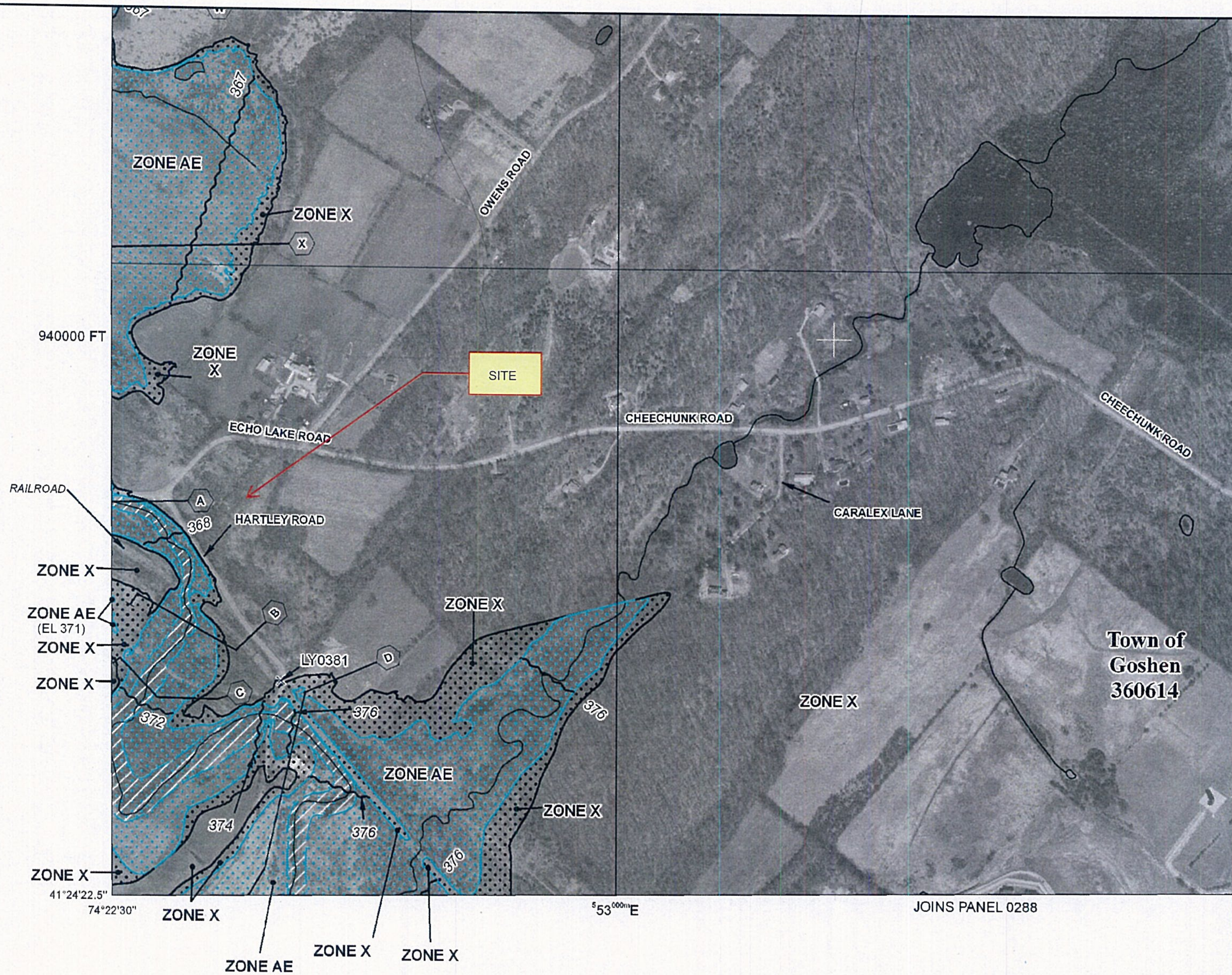
Date(s) aerial images were photographed: 8/13/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Orange County, New York (NY071)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Ab	Alden silt loam	0.0	0.0%
AdB	Allard silt loam, 3 to 8 percent slopes	3.9	7.9%
BnC	Bath-Nassau channery silt loams, 8 to 15 percent slopes	5.9	12.1%
CnB	Chenango gravelly silt loam, 3 to 8 percent slopes	0.1	0.2%
ErA	Erie gravelly silt loam, 0 to 3 percent slopes	0.2	0.4%
ErB	Erie gravelly silt loam, 3 to 8 percent slopes	7.8	15.9%
Ma	Madalin silt loam	3.9	8.0%
MdB	Mardin gravelly silt loam, 3 to 8 percent slopes	14.6	30.0%
MdC	Mardin gravelly silt loam, 8 to 15 percent slopes	3.3	6.7%
Pg	Pits, gravel	0.1	0.2%
RSD	Rock outcrop-Nassau complex, hilly	2.2	4.6%
SXC	Swartswood and Mardin very stony soils, sloping	5.6	11.4%
UnB	Unadilla silt loam, 0 to 8 percent slopes	1.3	2.7%
Totals for Area of Interest		**48.8**	**100.0%**

3



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 0286E

FIRM

FLOOD INSURANCE RATE MAP

for ORANGE COUNTY, NEW YORK
(ALL JURISDICTIONS)

CONTAINS:

COMMUNITY	NUMBER
GOSHEN, TOWN OF	360614
WALLKILL, TOWN OF	360634
WAWAYANDA, TOWN OF	360639

PANEL 286 OF 630
MAP SUFFIX: E
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
36071C0286E

EFFECTIVE DATE
AUGUST 3, 2009

Federal Emergency Management Agency

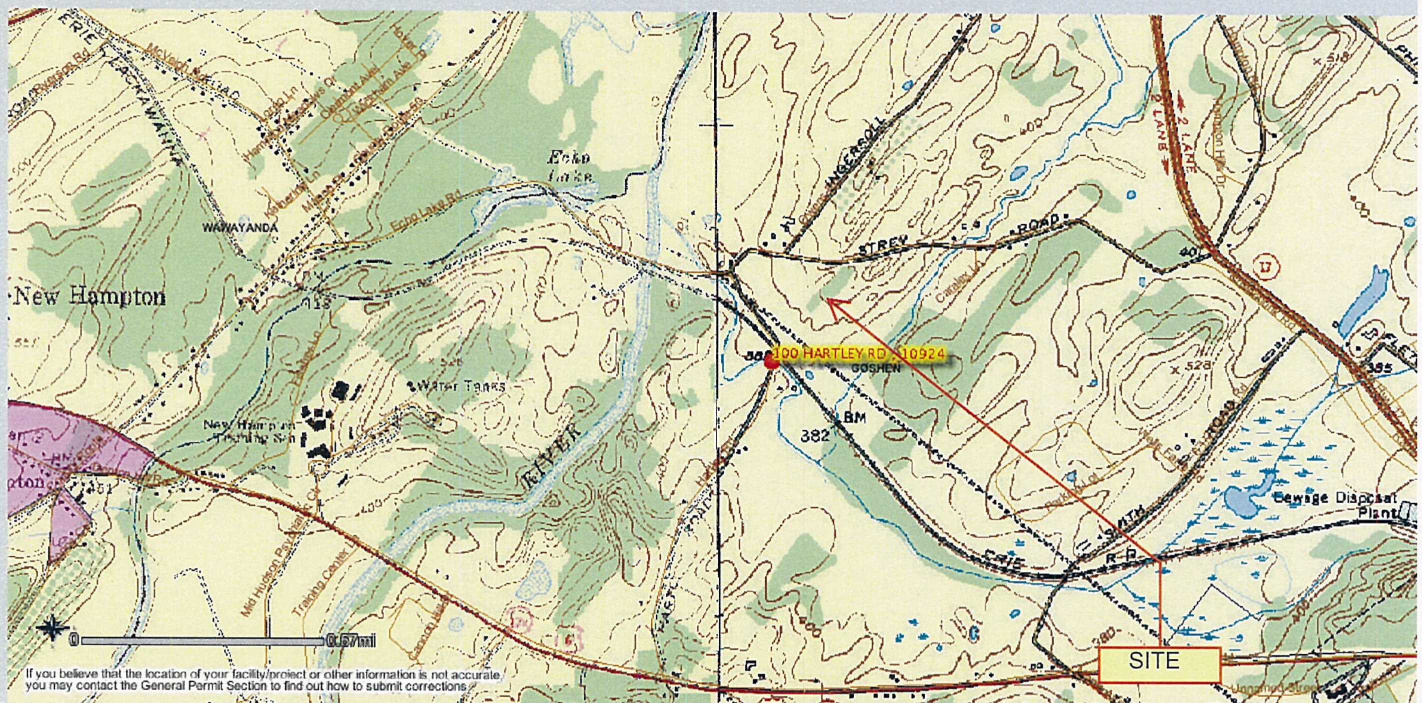
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

NEW YORK STATE - DEPARTMENT OF
ENVIRONMENTAL CONSERVATION

Stormwater Interactive Map

Search	Layers & Legend	Tell Me More...
Stormwater Permit Info	Contacts	Help

- Combined Sewer Overflow
- State & US Highways
- Watershed Improvement Strategy Area
  - 27 Long Island Shellfish Watersheds
  - Greenwood Lake
  - NYC EOH Watershed
  - Onondaga Lake
  - Oscawana Lake
  - Oyster Bay
  - Peconic Nitrogen
  - Peconic Pathogen
- Regulated MS4s
  - Automatic
  - Designation 2003
  - Designation 2008
  - Designation 2010
- 303(d) Construction Appendix E
  - Streams
  - Estuary
  - Lake



Click on a record # to zoom to or highlight that address

Record #	Address	Score
1	100 HARTLEY RD , 10924	100

4

CMX

Date:

RE: Hartley Road Substation
Goshen, NY
Our Project Number: 570312000100

Dear Sir or Madam:

Please consider this letter, written confirmation of the following acknowledgement being made this day of , 2011.

ENGINEER CERTIFICATION:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law.

W. Charles Utschig, Jr. P.E.
CMX
1311 Mamaroneck Avenue, Suite 50
White Plains, NY 10605
Phone: 914-686-1000
Fax: 914-686-1222

SPDES General Permit for Stormwater Runoff from Construction Activity, GP-0-10-001.

Date:

RE: Hartley Road Substation
Goshen, NY

Dear Sir or Madam:

Please consider this letter, written confirmation of the following acknowledgement being made this day of , 20 .

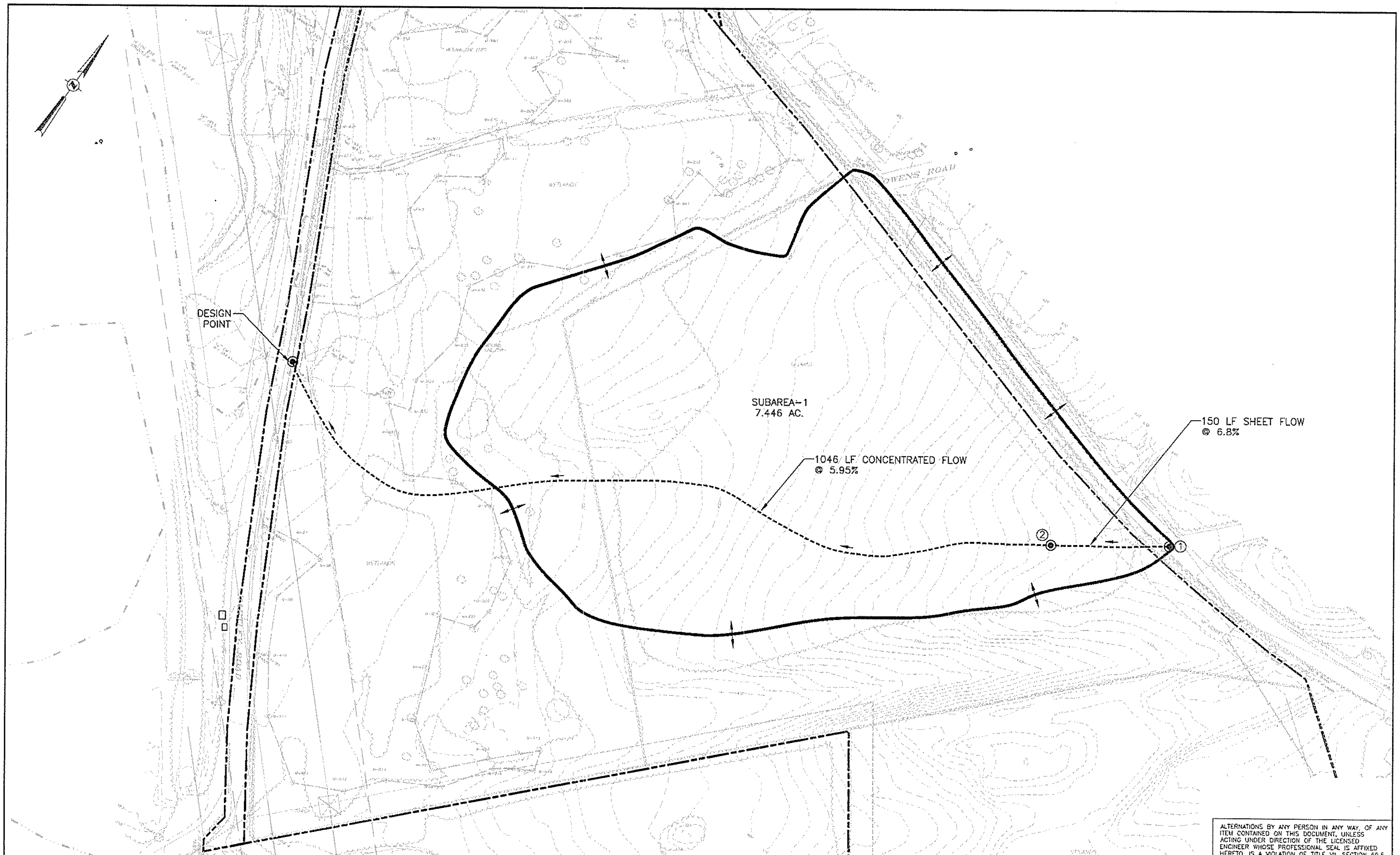
CONTRACTOR STATEMENT:

"I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the *qualified inspector* during a site inspection. I also understand that the *owner or operator* must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings."

Trained Contractor Information:	Trained Contractor Signature	SWPPP-specific task *responsible* for:
Name:____________ Title:____________ Address:____________ ____________ Telephone number: (____)____-______	X____________ Date:__________	____________ ____________ ____________ ____________ ____________

In accordance to Section III.A.6 of GP-0-10-001 "The owner or operator shall attach the certification statement(s) to the copy of the SWPPP that is maintained at the construction site. If new or additional contractors are hired to implement measures identified in the SWPPP after construction has commenced, they must also sign the certification statement and provide the information listed above."

5



ALTERNATIONS BY ANY PERSON IN ANY WAY, OF ANY ITEM CONTAINED ON THIS DOCUMENT, UNLESS ACTING UNDER DIRECTION OF THE LICENSED ENGINEER WHOSE PROFESSIONAL SEAL IS AFFIXED HERETO, IS A VIOLATION OF TITLE VII, SECTION 69.5 (b) OF NEW YORK STATE LAW.

REVISION NO.	DATE	REVISION

W. CHARLES UTSCHIG, JR.
PROFESSIONAL ENGINEER, N.Y. LIC. No. 62303-1

CMX

CMX ENGINEERING, SURVEY & LANDSCAPE ARCHITECTS, PC OF NEW YORK
AN AFFILIATE OF BIRDSALL SERVICES GROUP

1311 MAMARONECK AVENUE
SUITE 50
WHITE PLAINS, NY 10605
TEL (914)686-1000
FAX (914)686-1222

EXISTING CONDITIONS DRAINAGE AREA MAP
HARTLEY ROAD SUBSTATION
ORANGE AND ROCKLAND UTILITIES, INC.

TOWN OF GOSHEN ORANGE COUNTY NEW YORK

PROJECT NO. 570317000100	DATE 08/01/11
DRAWN BY JP	DESIGNED BY JP
SCALE 1"=50'	CHECKED BY MF
CMX	
SHEET NO. 1 of 1	

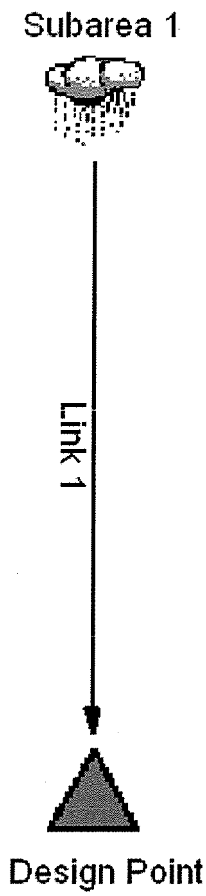

Subarea 1
Link 1
Design Point

Table of Contents

MASTER DESIGN STORM SUMMARY

Network Storm Collection: Orange County

Return Event	Total Depth in	Rainfall Type	RNF ID
1	2.9000	Synthetic Curve	TypeIII 24hr
10	5.5000	Synthetic Curve	TypeIII 24hr
25	6.5000	Synthetic Curve	TypeIII 24hr
100	8.0000	Synthetic Curve	TypeIII 24hr

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
*DESIGN POINT	JCT	1	.643		12.3000	5.52		
*DESIGN POINT	JCT	10	1.909		12.2500	17.01		
*DESIGN POINT	JCT	25	2.446		12.2500	21.77		
*DESIGN POINT	JCT	100	3.277		12.2500	29.00		
SUBAREA 1	AREA	1	.643		12.3000	5.52		
SUBAREA 1	AREA	10	1.909		12.2500	17.01		
SUBAREA 1	AREA	25	2.446		12.2500	21.77		
SUBAREA 1	AREA	100	3.277		12.2500	29.00		

File.... M:\WhitePlains\Jobs\Orange and Rockland Utilities\570312000100\SWPPP\Existing Con

Title... Project Date: 2/27/2009
Project Engineer: jparedes
Project Title: Corporate Drive Substation
Project Comments:

DESIGN STORMS SUMMARY

Design Storm File,ID = Orange County

```
Storm Tag Name      = 1
------------------------------------------------------------------------
Data Type, File, ID = Synthetic Storm    TypeIII 24hr
Storm Frequency     = 1 yr
Total Rainfall Depth= 2.9000 in
Duration Multiplier =  1
Resulting Duration  = 24.0000 hrs
Resulting Start Time= .0000 hrs  Step= .1000 hrs  End= 24.0000 hrs

Storm Tag Name      =     10
------------------------------------------------------------------------
Data Type, File, ID = Synthetic Storm    TypeIII 24hr
Storm Frequency     = 10 yr
Total Rainfall Depth= 5.5000 in
Duration Multiplier =  1
Resulting Duration  = 24.0000 hrs
Resulting Start Time= .0000 hrs  Step= .1000 hrs  End= 24.0000 hrs

Storm Tag Name      =     25
------------------------------------------------------------------------
Data Type, File, ID = Synthetic Storm    TypeIII 24hr
Storm Frequency     = 25 yr
Total Rainfall Depth= 6.5000 in
Duration Multiplier =  1
Resulting Duration  = 24.0000 hrs
Resulting Start Time= .0000 hrs  Step= .1000 hrs  End= 24.0000 hrs

Storm Tag Name      =    100
------------------------------------------------------------------------
Data Type, File, ID = Synthetic Storm    TypeIII 24hr
Storm Frequency     = 100 yr
Total Rainfall Depth= 8.0000 in
Duration Multiplier =  1
Resulting Duration  = 24.0000 hrs
Resulting Start Time= .0000 hrs  Step= .1000 hrs  End= 24.0000 hrs
```

::
TIME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet

Mannings n	.4000	
Hydraulic Length	150.00	ft
2yr, 24hr P	3.5000	in
Slope	.068000	ft/ft
Avg.Velocity	.14	ft/sec

Segment #1 Time: .2901 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length	1046.00	ft
Slope	.059500	ft/ft
Unpaved		
Avg.Velocity	3.94	ft/sec

Segment #2 Time: .0738 hrs

Total Tc: .3639 hrs

Tc Equations used...

```
==== SCS TR-55 Sheet Flow ===============================================

     Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

     Where:  Tc = Time of concentration, hrs
             n  = Mannings n
             Lf = Flow length, ft
             P  = 2yr, 24hr Rain depth, inches
             Sf = Slope, %

==== SCS TR-55 Shallow Concentrated Flow ================================

     Unpaved surface:
     V  = 16.1345 * (Sf**0.5)

     Paved surface:
     V  = 20.3282 * (Sf**0.5)

     Tc = (Lf / V) / (3600sec/hr)

     Where:  V  = Velocity, ft/sec
             Sf = Slope, ft/ft
             Tc = Time of concentration, hrs
             Lf =.Flow length, ft
```

File.... M:\WhitePlains\Jobs\Orange and Rockland Utilities\570312000100\SWPPP\Existing Con

RUNOFF CURVE NUMBER DATA

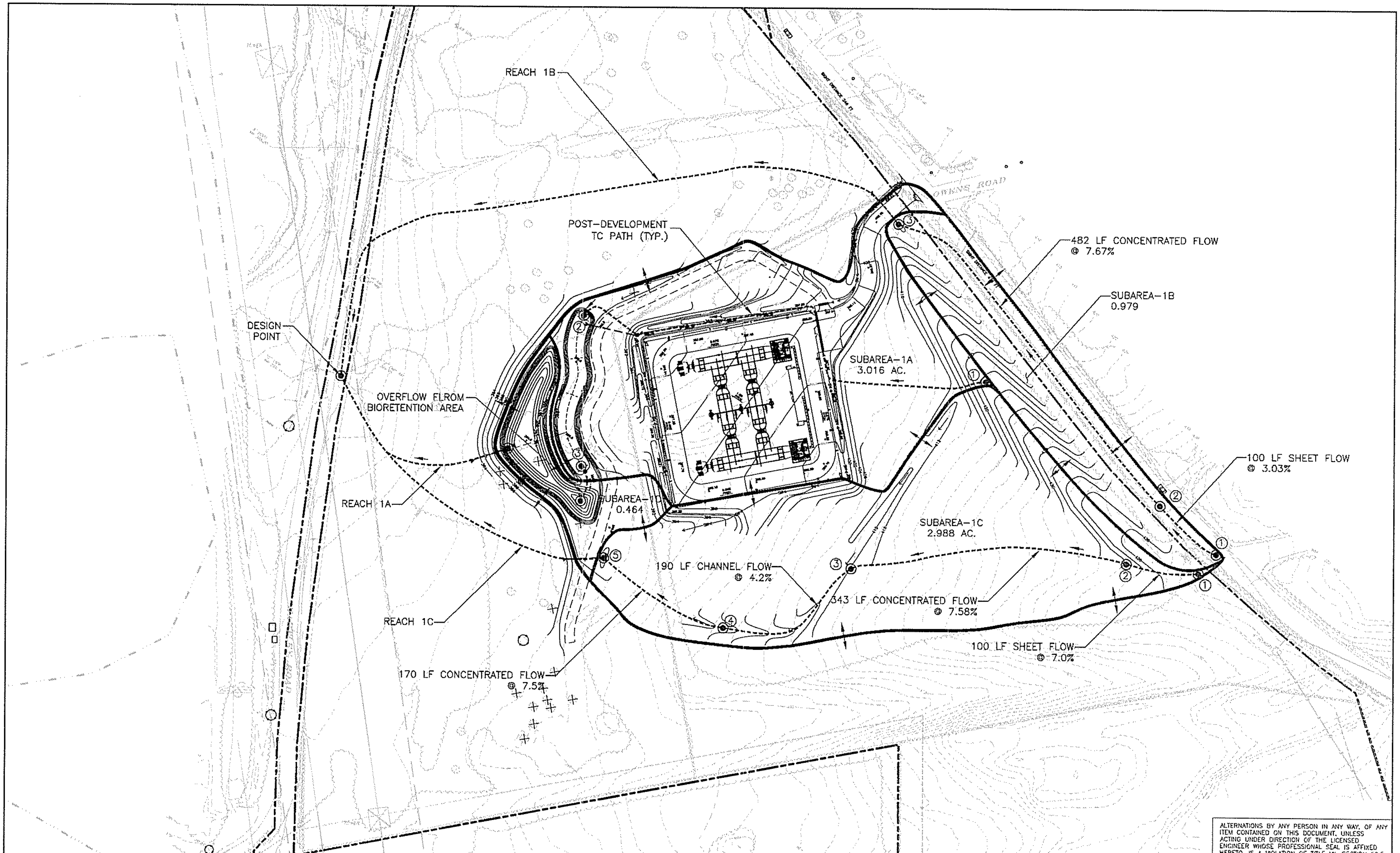
::

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	Impervious Adjustment %UC	Adjusted CN
Woods - grass combination - fair	76	2.010			76.00
Paved Roadway	98	.017			98.00
Pasture, grassland, or range - fair	79	5.270			79.00
COMPOSITE AREA & WEIGHTED CN --->		7.297			78.22 (78)

::

Index of Starting Page Numbers for ID Names

6



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REVISION NO.	DATE	REVISION

GRAPHIC SCALE IN FEET 1"=50'

W. CHARLES UTSCHIG, JR.
PROFESSIONAL ENGINEER, N.Y. LIC No. 62303-1

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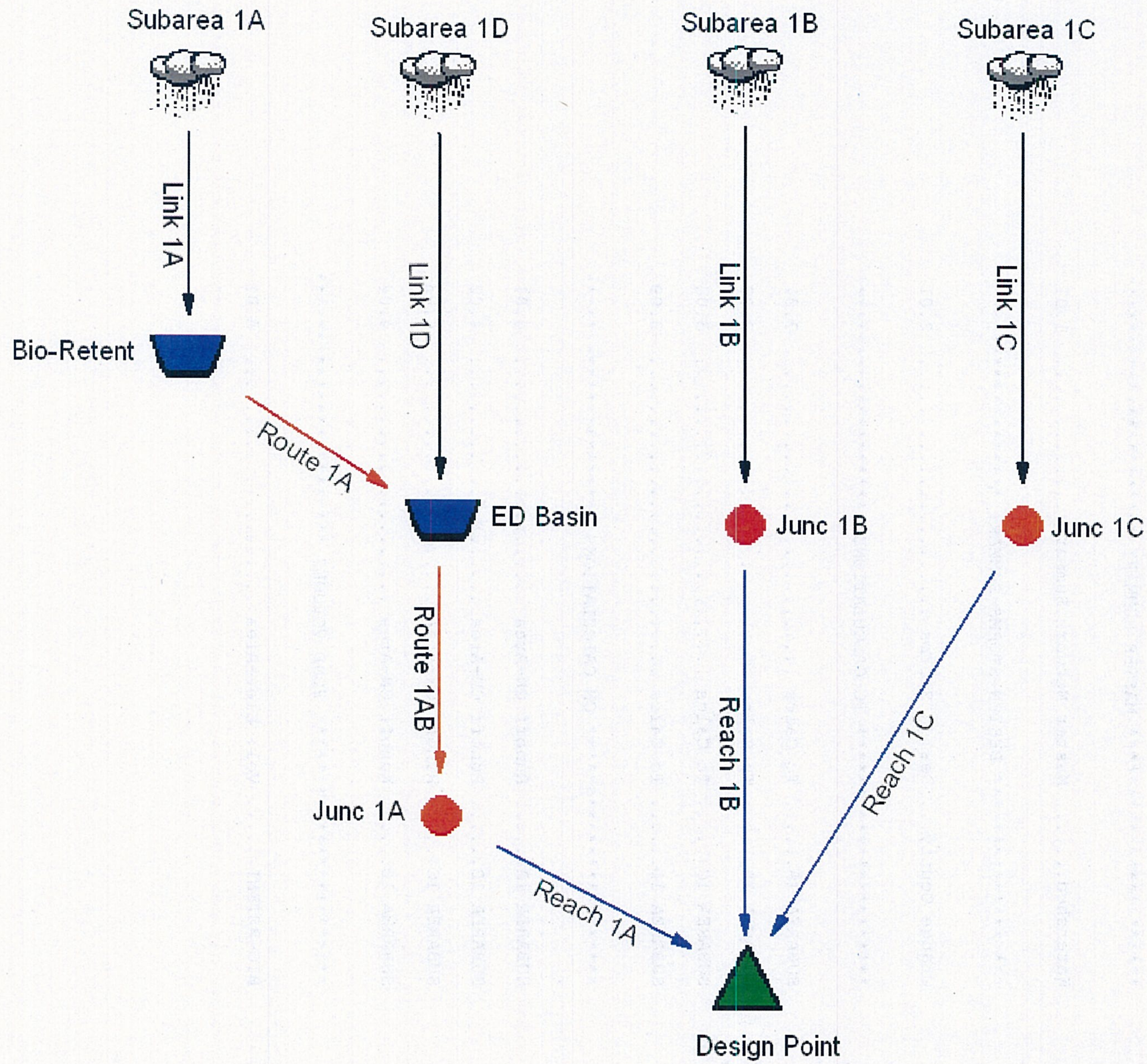
PROPOSED CONDITIONS DRAINAGE AREA MAP
HARTLEY ROAD SUBSTATION
ORANGE AND ROCKLAND UTILITIES INC.

TOWN OF GOSHEN ORANGE COUNTY NEW YORK

PROJECT NO.	DATE
570313000100	08/01/11
DRAWN BY: JP	DESIGNED BY: JP
SCALE: 1"=50'	CHECKED BY: MF
CMX	
SHEET NO. 1 of 1	



Subarea 1A
Subarea 1D
Subarea 1B
Subarea 1C
Link 1A
Link 1D
Link 1B
Link 1C
Bio-Retent
Route 1A
ED Basin
Junc 1B
Junc 1C
Route 1AB
Junc 1A
Reach 1B
Reach 1C
Reach 1A
Design Point

Table of Contents

Table of Contents (continued)

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MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
BIO-RETENT IN	POND	1	.360		12.1000	4.41		
BIO-RETENT IN	POND	10	.937		12.1000	11.23		
BIO-RETENT IN	POND	25	1.172		12.1000	13.90		
BIO-RETENT IN	POND	100	1.531		12.1000	17.89		
BIO-RETENT OUT	POND	1	.306		12.1500	4.19	388.65	.072
BIO-RETENT OUT	POND	10	.883		12.1000	10.85	388.80	.090
BIO-RETENT OUT	POND	25	1.118		12.1000	13.56	388.84	.096
BIO-RETENT OUT	POND	100	1.477		12.1000	17.54	388.91	.104
*DESIGN POINT	JCT	1	.732		12.2500	4.12		
*DESIGN POINT	JCT	10	2.099		12.2500	15.64		
*DESIGN POINT	JCT	25	2.665		12.2500	19.36		
*DESIGN POINT	JCT	100	3.534		12.3500	25.60		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID		Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
ED BASIN	IN	POND	1	.350		12.1500	4.67		
ED BASIN	IN	POND	10	1.008		12.1000	12.38		
ED BASIN	IN	POND	25	1.278		12.1000	15.49		
ED BASIN	IN	POND	100	1.690		12.1000	20.08		
ED BASIN	OUT	POND	1	.349		12.5500	1.26	385.62	.119
ED BASIN	OUT	POND	10	1.008		12.4000	5.28	387.15	.309
ED BASIN	OUT	POND	25	1.277		12.4000	6.10	387.69	.395
ED BASIN	OUT	POND	100	1.690		12.3000	10.55	388.20	.487
JUNC 1A		JCT	1	.349		12.5500	1.26		
JUNC 1A		JCT	10	1.008		12.4000	5.28		
JUNC 1A		JCT	25	1.277		12.4000	6.10		
JUNC 1A		JCT	100	1.690		12.3000	10.55		
JUNC 1B		JCT	1	.106		12.1000	1.32		
JUNC 1B		JCT	10	.288		12.1000	3.53		
JUNC 1B		JCT	25	.363		12.1000	4.40		
JUNC 1B		JCT	100	.478		12.1000	5.71		
JUNC 1C		JCT	1	.277		12.2000	2.76		
JUNC 1C		JCT	10	.803		12.2000	8.14		
JUNC 1C		JCT	25	1.025		12.2000	10.33		
JUNC 1C		JCT	100	1.367		12.2000	13.65		
SUBAREA 1A		AREA	1	.360		12.1000	4.41		
SUBAREA 1A		AREA	10	.937		12.1000	11.23		
SUBAREA 1A		AREA	25	1.172		12.1000	13.90		
SUBAREA 1A		AREA	100	1.531		12.1000	17.89		
SUBAREA 1B		AREA	1	.106		12.1000	1.32		
SUBAREA 1B		AREA	10	.288		12.1000	3.53		
SUBAREA 1B		AREA	25	.363		12.1000	4.40		
SUBAREA 1B		AREA	100	.478		12.1000	5.71		

MASTER NETWORK SUMMARY
SCS Unit Hydrograph Method

(*Node=Outfall; +Node=Diversion;)
(Trun= HYG Truncation: Blank=None; L=Left; R=Rt; LR=Left&Rt)

Node ID	Type	Return Event	HYG Vol ac-ft	Trun	Qpeak hrs	Qpeak cfs	Max WSEL ft	Max Pond Storage ac-ft
SUBAREA 1C	AREA	1	.277		12.2000	2.76		
SUBAREA 1C	AREA	10	.803		12.2000	8.14		
SUBAREA 1C	AREA	25	1.025		12.2000	10.33		
SUBAREA 1C	AREA	100	1.367		12.2000	13.65		
SUBAREA 1D	AREA	1	.043		12.1000	.52		
SUBAREA 1D	AREA	10	.125		12.1000	1.52		
SUBAREA 1D	AREA	25	.160		12.1000	1.93		
SUBAREA 1D	AREA	100	.213		12.1000	2.55		

```
Title... Project Date: 2/27/2009
         Project Engineer: jparedes
         Project Title: Corporate Drive Substation
         Project Comments:

                DESIGN STORMS SUMMARY

 Design Storm File,ID =              Orange County


 Storm Tag Name      = 1
 ----------------------------------------------------------------------
 Data Type, File, ID = Synthetic Storm    TypeIII 24hr
 Storm Frequency     = 1 yr
 Total Rainfall Depth= 2.9000 in
 Duration Multiplier =  1
 Resulting Duration  = 24.0000 hrs
 Resulting Start Time= .0000 hrs  Step= .1000 hrs  End= 24.0000 hrs


 Storm Tag Name      =     10
 ----------------------------------------------------------------------
 Data Type, File, ID = Synthetic Storm    TypeIII 24hr
 Storm Frequency     = 10 yr
 Total Rainfall Depth= 5.5000 in
 Duration Multiplier =  1
 Resulting Duration  = 24.0000 hrs
 Resulting Start Time= .0000 hrs  Step= .1000 hrs  End= 24.0000 hrs


 Storm Tag Name      =     25
 ----------------------------------------------------------------------
 Data Type, File, ID = Synthetic Storm    TypeIII 24hr
 Storm Frequency     = 25 yr
 Total Rainfall Depth= 6.5000 in
 Duration Multiplier =  1
 Resulting Duration  = 24.0000 hrs
 Resulting Start Time= .0000 hrs  Step= .1000 hrs  End= 24.0000 hrs


 Storm Tag Name      =    100
 ----------------------------------------------------------------------
 Data Type, File, ID = Synthetic Storm    TypeIII 24hr
 Storm Frequency     = 100 yr
 Total Rainfall Depth= 8.0000 in
 Duration Multiplier =  1
 Resulting Duration  = 24.0000 hrs
 Resulting Start Time= .0000 hrs  Step= .1000 hrs  End= 24.0000 hrs
```

::

TIME OF CONCENTRATION CALCULATOR

::

Segment #1: Tc: User Defined

Segment #1 Time: .1000 hrs

========================

Total Tc: .1000 hrs

========================

Tc Equations used...

==== User Defined ==

Tc = Value entered by user

Where: Tc = Time of concentration

```
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
TIME OF CONCENTRATION CALCULATOR
::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::

------------------------------------------------------------------------

Segment #1:  Tc: TR-55 Sheet

Mannings n            .0110
Hydraulic Length    100.00 ft
2yr, 24hr P         3.5000 in
Slope              .030300 ft/ft

Avg.Velocity          1.70 ft/sec

                                      Segment #1 Time:     .0164 hrs
------------------------------------------------------------------------

Segment #2:  Tc: TR-55 Shallow

Hydraulic Length    482.00 ft
Slope              .076700 ft/ft
Unpaved

Avg.Velocity          4.47 ft/sec

                                      Segment #2 Time:     .0300 hrs
------------------------------------------------------------------------

                                            =========================
                                             Total Tc:      .0463 hrs

                                             Calculated Tc < Min.Tc:
                                             Use Minimum Tc...
                                             Use Tc =       .0833 hrs
                                            =========================
```

Tc Equations used...

==== SCS TR-55 Sheet Flow ====

```
Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

Where:  Tc = Time of concentration, hrs
        n  = Mannings n
        Lf = Flow length, ft
        P  = 2yr, 24hr Rain depth, inches
        Sf = Slope, %
```

==== SCS TR-55 Shallow Concentrated Flow ====

```
Unpaved surface:
V  = 16.1345 * (Sf**0.5)

Paved surface:
V  = 20.3282 * (Sf**0.5)

Tc = (Lf / V) / (3600sec/hr)

Where:  V  = Velocity, ft/sec
        Sf = Slope, ft/ft
        Tc = Time of concentration, hrs
        Lf = Flow length, ft
```

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::
TIME OF CONCENTRATION CALCULATOR
::

Segment #1: Tc: TR-55 Sheet

Mannings n	.4000
Hydraulic Length	100.00 ft
2yr, 24hr P	3.5000 in
Slope	.070000 ft/ft
Avg.Velocity	.13 ft/sec

Segment #1 Time: .2073 hrs

Segment #2: Tc: TR-55 Shallow

Hydraulic Length	343.00 ft
Slope	.075800 ft/ft
Unpaved	
Avg.Velocity	4.44 ft/sec

Segment #2 Time: .0214 hrs

Segment #3: Tc: TR-55 Channel

Flow Area	6.8000 sq.ft
Wetted Perimeter	13.20 ft
Hydraulic Radius	.52 ft
Slope	.042000 ft/ft
Mannings n	.0300
Hydraulic Length	190.00 ft
Avg.Velocity	6.54 ft/sec

Segment #3 Time: .0081 hrs

Segment #4: Tc: TR-55 Shallow

Hydraulic Length   170.00 ft
Slope   .075000 ft/ft
Unpaved

Avg.Velocity   4.42 ft/sec

Segment #4 Time: .0107 hrs

Total Tc: .2475 hrs

```
------------------------------------------------------------------------
Tc Equations used...
------------------------------------------------------------------------


==== SCS TR-55 Sheet Flow =============================================

     Tc = (.007 * ((n * Lf)**0.8)) / ((P**.5) * (Sf**.4))

     Where:  Tc = Time of concentration, hrs
             n  = Mannings n
             Lf = Flow length, ft
             P  = 2yr, 24hr Rain depth, inches
             Sf = Slope, %


==== SCS TR-55 Shallow Concentrated Flow ==============================

     Unpaved surface:
     V  = 16.1345 * (Sf**0.5)

     Paved surface:
     V  = 20.3282 * (Sf**0.5)

     Tc = (Lf / V) / (3600sec/hr)

     Where:  V  = Velocity, ft/sec
             Sf = Slope, ft/ft
             Tc = Time of concentration, hrs
             Lf = Flow length, ft
```

==== SCS Channel Flow ==

```
R  = Aq / Wp
V  = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

Tc = (Lf / V) / (3600sec/hr)

Where:  R  = Hydraulic radius
        Aq = Flow area, sq.ft.
        Wp = Wetted perimeter, ft
        V  = Velocity, ft/sec
        Sf = Slope, ft/ft
        n  = Mannings n
        Tc = Time of concentration, hrs
        Lf = Flow length, ft
```

::

TIME OF CONCENTRATION CALCULATOR

::

Segment #1: Tc: User Defined

Segment #1 Time: .1000 hrs

Total Tc: .1000 hrs

Tc Equations used...

==== User Defined ==

Tc = Value entered by user

Where: Tc = Time of concentration

RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	Impervious Adjustment %UC	Adjusted CN
Open space (Lawns,parks etc.) - Fai	79	1.149			79.00
Impervious Areas - Gravel (w/ right	85	.771			85.00
Pasture, grassland, or range - fair	79	.599			79.00
Impervious Areas - Building/Concret	98	.496			98.00
COMPOSITE AREA & WEIGHTED CN --->		3.015			83.66 (84)

File.... M:\WhitePlains\Jobs\Orange and Rockland Utilities\570312000100\SWPPP\Proposed Con

RUNOFF CURVE NUMBER DATA

::

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	%UC	Adjusted CN
Paved road	98	.154			98.00
Open space (Lawns,parks etc.) - Fai	79	.825			79.00
COMPOSITE AREA & WEIGHTED CN --->		.979			81.99 (82)

::

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RUNOFF CURVE NUMBER DATA

::

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	Impervious Adjustment %UC	Adjusted CN
Pasture, grassland, or range - fair	79	1.944			79.00
Open space (Lawns,parks etc.) - Fai	79	1.034			79.00
COMPOSITE AREA & WEIGHTED CN --->		2.978			79.00 (79)

::

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RUNOFF CURVE NUMBER DATA

Soil/Surface Description	CN	Area acres	Impervious Adjustment %C	Impervious Adjustment %UC	Adjusted CN
Pasture, grassland, or range - fair	79	.464			79.00
COMPOSITE AREA & WEIGHTED CN --->		.464			79.00 (79)

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
388.00	-----	.1000	.0000	.000	.000
388.50	-----	.1160	.3237	.054	.054
389.00	-----	.1320	.3717	.062	.116
389.50	-----	.1480	.4198	.070	.186

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

File.... M:\WhitePlains\Jobs\Orange and Rockland Utilities\570312000100\SWPPP\Proposed Con

Elevation (ft)	Planimeter (sq.in)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	Volume (ac-ft)	Volume Sum (ac-ft)
384.00	-----	.0490	.0000	.000	.000
385.00	-----	.0790	.1902	.063	.063
386.00	-----	.1110	.2836	.095	.158
387.00	-----	.1460	.3843	.128	.286
388.00	-----	.1820	.4910	.164	.450
389.00	-----	.2190	.6006	.200	.650
389.50	-----	.2358	.6820	.114	.764

POND VOLUME EQUATIONS

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

File.... M:\WhitePlains\Jobs\Orange and Rockland Utilities\570312000100\SWPPP\Proposed Con

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 388.00 ft
Increment = .10 ft
Max. Elev.= 389.50 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Weir-Rectangular	W0	--->	TW	388.500	389.500
TW SETUP, DS Channel					

File.... M:\WhitePlains\Jobs\Orange and Rockland Utilities\570312000100\SWPPP\Proposed Con

OUTLET STRUCTURE INPUT DATA

```
Structure ID        = WO
Structure Type      = Weir-Rectangular
------------------------------------
# of Openings       =        1
Crest Elev.         =    388.50 ft
Weir Length         =     20.00 ft
Weir Coeff.         =  3.330000

Weir TW effects      (Use adjustment equation)


Structure ID        = TW
Structure Type      = TW SETUP, DS Channel
------------------------------------
FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations=    40
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .00 cfs
Max.  Q tolerance =    .00 cfs
```

REQUESTED POND WS ELEVATIONS:

Min. Elev.= 384.00 ft
Increment = .10 ft
Max. Elev.= 389.50 ft

****
OUTLET CONNECTIVITY
****

---> Forward Flow Only (UpStream to DnStream)
<--- Reverse Flow Only (DnStream to UpStream)
<---> Forward and Reverse Both Allowed

Structure	No.		Outfall	E1, ft	E2, ft
Orifice-Circular	O1	--->	O2	385.100	389.500
Inlet Box	R0	--->	O2	388.000	389.500
Orifice-Circular	O0	--->	O2	384.000	389.500
Orifice-Circular	O2	--->	TW	384.000	389.500
TW SETUP, DS Channel					

OUTLET STRUCTURE INPUT DATA

```
Structure ID       = O1
Structure Type     = Orifice-Circular
------------------------------------
# of Openings      =        1
Invert Elev.       =    385.10 ft
Diameter           =    1.0000 ft
Orifice Coeff.     =      .600


Structure ID       = R0
Structure Type     = Inlet Box
------------------------------------
# of Openings      =        1
Invert Elev.       =    388.00 ft
Orifice Area       =   16.0000 sq.ft
Orifice Coeff.     =      .600
Weir Length        =     16.00 ft
Weir Coeff.        =     3.330
K, Reverse         =     1.000
Mannings n         =     .0000
Kev,Charged Riser  =      .000
Weir Submergence   = No


Structure ID       = O0
Structure Type     = Orifice-Circular
------------------------------------
# of Openings      =        1
Invert Elev.       =    384.00 ft
Diameter           =     .3333 ft
Orifice Coeff.     =      .600
```

```
OUTLET STRUCTURE INPUT DATA


Structure ID        = O2
Structure Type      = Orifice-Circular
------------------------------------
# of Openings       =          1
Invert Elev.        =     384.00 ft
Diameter            =     1.5000 ft
Orifice Coeff.      =       .600


Structure ID        = TW
Structure Type      = TW SETUP, DS Channel
------------------------------------
FREE OUTFALL CONDITIONS SPECIFIED

CONVERGENCE TOLERANCES...
Maximum Iterations=    40
Min. TW tolerance =    .01 ft
Max. TW tolerance =    .01 ft
Min. HW tolerance =    .01 ft
Max. HW tolerance =    .01 ft
Min.  Q tolerance =    .00 cfs
Max.  Q tolerance =    .00 cfs
```

LEVEL POOL ROUTING DATA

HYG Dir = M:\WhitePlains\Jobs\Orange and Rockland Utilities\570312000100\SWPPP\
Inflow HYG file = NONE STORED - BIO-RETENT IN 1
Outflow HYG file = NONE STORED - BIO-RETENT OUT 1

Pond Node Data = BIO-RETENT
Pond Volume Data = BIO-RETENT
Pond Outlet Data = Outlet 1

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 388.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .0500 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
388.00	.00	.000	.1000	.00	.00	.00
388.10	.00	.010	.1031	.00	.00	4.92
388.20	.00	.021	.1063	.00	.00	9.98
388.30	.00	.031	.1095	.00	.00	15.20
388.40	.00	.043	.1127	.00	.00	20.58
388.50	.00	.054	.1160	.00	.00	26.11
388.60	2.11	.066	.1191	.00	2.11	33.91
388.70	5.96	.078	.1223	.00	5.96	43.60
388.80	10.94	.090	.1255	.00	10.94	54.58
388.90	16.85	.103	.1287	.00	16.85	66.64
389.00	23.55	.116	.1320	.00	23.55	79.65
389.10	30.95	.129	.1351	.00	30.95	93.52
389.20	39.01	.143	.1383	.00	39.01	108.19
389.30	47.65	.157	.1415	.00	47.65	123.60
389.40	56.86	.171	.1447	.00	56.86	139.74
389.50	66.60	.186	.1480	.00	66.60	156.56

LEVEL POOL ROUTING DATA

HYG Dir = M:\WhitePlains\Jobs\Orange and Rockland Utilities\570312000100\SWPPP\
Inflow HYG file = NONE STORED - ED BASIN IN 1
Outflow HYG file = NONE STORED - ED BASIN OUT 1

Pond Node Data = ED BASIN
Pond Volume Data = ED BASIN
Pond Outlet Data = Outlet 2

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 384.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .0500 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
384.00	.00	.000	.0490	.00	.00	.00
384.10	.02	.005	.0517	.00	.02	2.45
384.20	.06	.010	.0544	.00	.06	5.07
384.30	.13	.016	.0573	.00	.13	7.84
384.40	.18	.022	.0601	.00	.18	10.73
384.50	.22	.028	.0631	.00	.22	13.75
384.60	.25	.034	.0661	.00	.25	16.91
384.70	.28	.041	.0693	.00	.28	20.21
384.80	.31	.048	.0724	.00	.31	23.67
384.90	.33	.056	.0757	.00	.33	27.28
385.00	.35	.063	.0790	.00	.35	31.04
385.10	.37	.071	.0820	.00	.37	34.96
385.20	.43	.080	.0850	.00	.43	39.05
385.30	.54	.088	.0880	.00	.54	43.35
385.40	.71	.097	.0911	.00	.71	47.85
385.50	.92	.107	.0943	.00	.92	52.56
385.60	1.19	.116	.0975	.00	1.19	57.47
385.70	1.50	.126	.1008	.00	1.50	62.58
385.80	1.85	.136	.1042	.00	1.85	67.89
385.90	2.22	.147	.1076	.00	2.22	73.38

LEVEL POOL ROUTING DATA

HYG Dir = M:\WhitePlains\Jobs\Orange and Rockland Utilities\570312000100\SWPPP\
Inflow HYG file = NONE STORED - ED BASIN IN 1
Outflow HYG file = NONE STORED - ED BASIN OUT 1

Pond Node Data = ED BASIN
Pond Volume Data = ED BASIN
Pond Outlet Data = Outlet 2

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 384.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .0500 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
386.00	2.63	.158	.1110	.00	2.63	79.07
386.10	3.12	.169	.1143	.00	3.12	85.03
386.20	3.40	.181	.1176	.00	3.40	90.91
386.30	3.64	.193	.1210	.00	3.64	96.93
386.40	3.87	.205	.1244	.00	3.87	103.10
386.50	4.09	.218	.1279	.00	4.09	109.42
386.60	4.29	.231	.1314	.00	4.29	115.90
386.70	4.49	.244	.1350	.00	4.49	122.54
386.80	4.68	.258	.1386	.00	4.68	129.35
386.90	4.86	.272	.1423	.00	4.86	136.34
387.00	5.04	.286	.1460	.00	5.04	143.49
387.10	5.20	.301	.1494	.00	5.20	150.80
387.20	5.37	.316	.1529	.00	5.37	158.28
387.30	5.52	.331	.1564	.00	5.52	165.92
387.40	5.68	.347	.1599	.00	5.68	173.74
387.50	5.83	.363	.1635	.00	5.83	181.71
387.60	5.97	.380	.1671	.00	5.97	189.85
387.70	6.11	.397	.1708	.00	6.11	198.17
387.80	6.26	.414	.1745	.00	6.26	206.67
387.90	6.40	.432	.1782	.00	6.40	215.35

LEVEL POOL ROUTING DATA

HYG Dir = M:\WhitePlains\Jobs\Orange and Rockland Utilities\570312000100\SWPPP\
Inflow HYG file = NONE STORED - ED BASIN IN 1
Outflow HYG file = NONE STORED - ED BASIN OUT 1

Pond Node Data = ED BASIN
Pond Volume Data = ED BASIN
Pond Outlet Data = Outlet 2

No Infiltration

INITIAL CONDITIONS

Starting WS Elev = 384.00 ft
Starting Volume = .000 ac-ft
Starting Outflow = .00 cfs
Starting Infiltr. = .00 cfs
Starting Total Qout= .00 cfs
Time Increment = .0500 hrs

Elevation ft	Outflow cfs	Storage ac-ft	Area acres	Infilt. cfs	Q Total cfs	2S/t + O cfs
388.00	6.53	.450	.1820	.00	6.53	224.20
388.10	8.21	.468	.1855	.00	8.21	234.77
388.20	10.56	.487	.1891	.00	10.56	246.19
388.30	13.23	.506	.1927	.00	13.23	258.10
388.40	15.65	.525	.1964	.00	15.65	269.93
388.50	16.47	.545	.2001	.00	16.47	280.35
388.60	16.69	.565	.2038	.00	16.69	290.34
388.70	16.90	.586	.2075	.00	16.90	300.51
388.80	17.12	.607	.2113	.00	17.12	310.86
388.90	17.33	.628	.2151	.00	17.33	321.39
389.00	17.53	.650	.2190	.00	17.53	332.10
389.10	17.74	.672	.2223	.00	17.74	342.99
389.20	17.94	.694	.2256	.00	17.94	354.03
389.30	18.14	.717	.2290	.00	18.14	365.23
389.40	18.34	.740	.2324	.00	18.34	376.60
389.50	18.54	.764	.2358	.00	18.54	388.13

Index of Starting Page Numbers for ID Names

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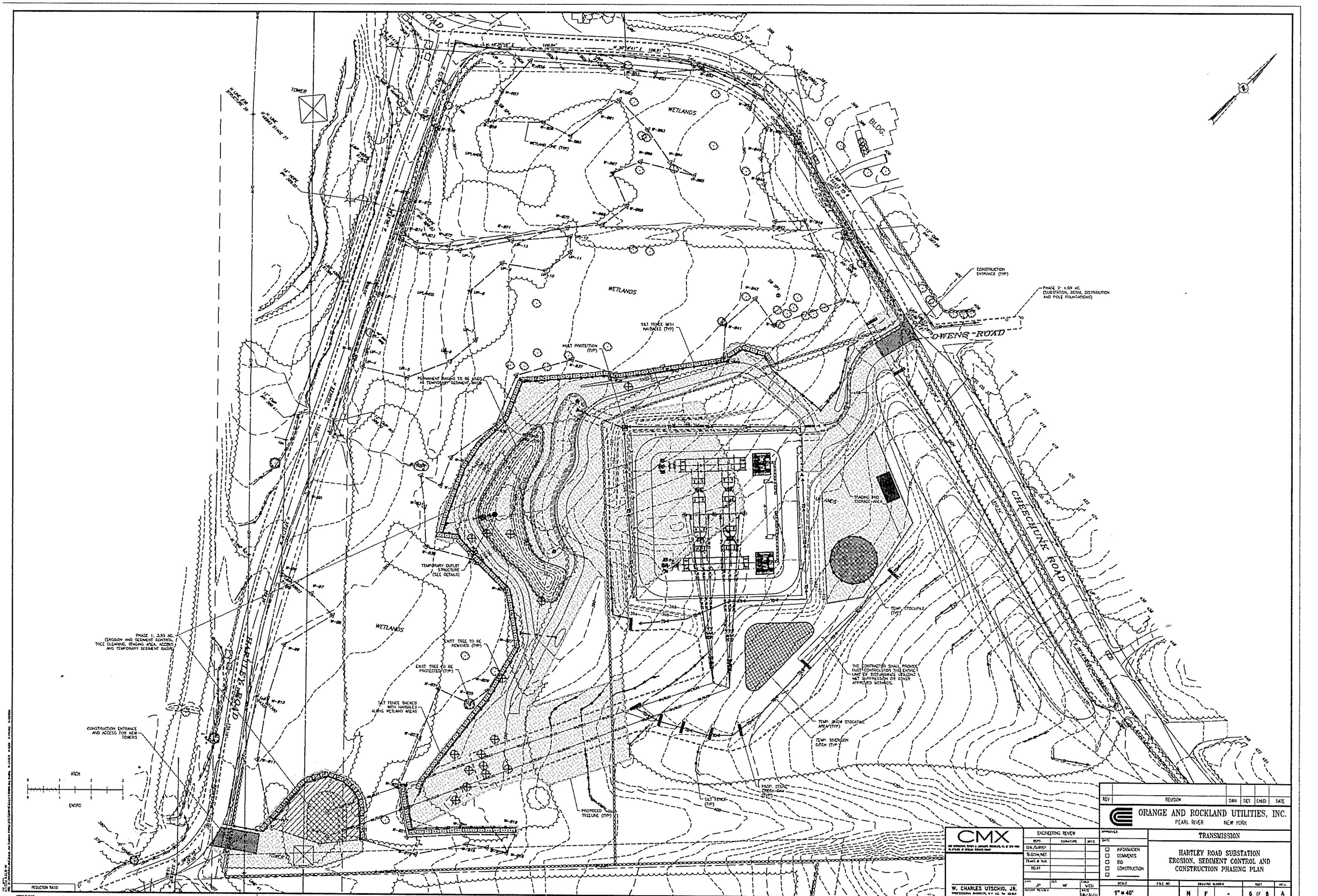


REV	REVISION	DWN	DES	CHKD	DATE

ORANGE AND ROCKLAND UTILITIES, INC.
PEARL RIVER NEW YORK

CMX

W. CHARLES UTSCHIG, JR.
PROFESSIONAL ENGINEER, N.Y. LIC. No. 62353

ENGINEERING REVIEW

APPROVALS

- ☐ INFORMATION
- ☐ COMMENTS
- ☐ BID
- ☐ CONSTRUCTION

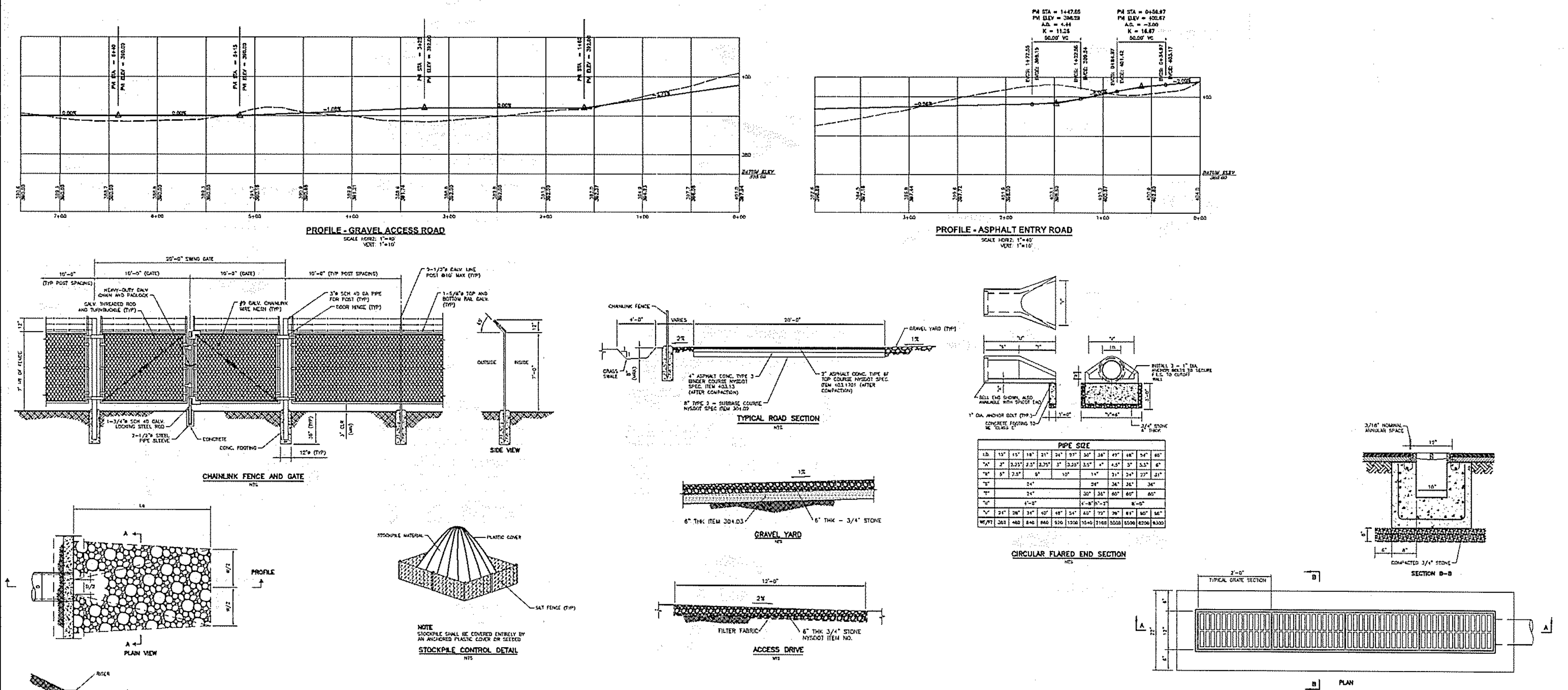
TRANSMISSION

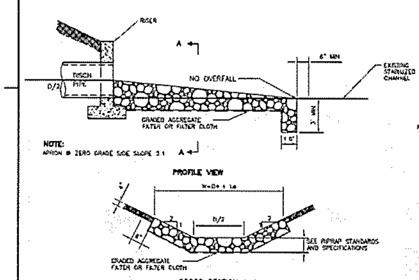
HARTLEY ROAD SUBSTATION
EROSION, SEDIMENT CONTROL AND
CONSTRUCTION PHASING PLAN

SCALE: 1" = 40'

DRAWING NUMBER: N F - 6 of 8 A

8

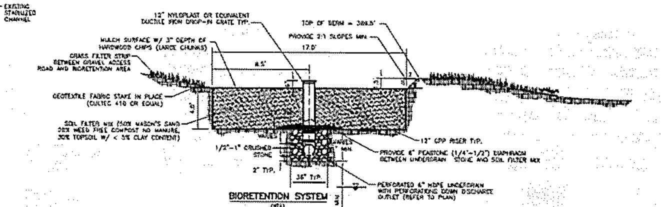


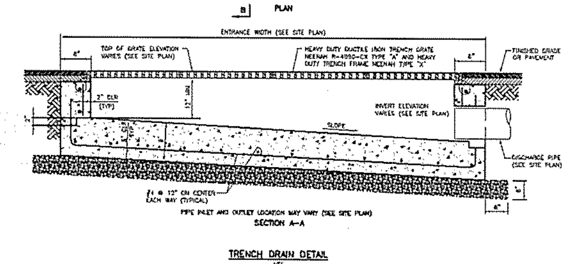


NOTE:
APRON @ ZERO GRADE SIDE SLOPE 2:1

NOTE:
SEE RIPRAP STANDARDS AND SPECIFICATIONS
MINIMUM TAILWATER CONDITIONS

RIPRAP OUTLET PROTECTION
NTS





TRENCH DRAIN DETAIL
NTS

CONSTRUCTION SEQUENCE

1. STAKE THE LIMITS AND PROVIDE OFFSETS OF THE PROPOSED BIORETENTION AREA AND SET ACCESSIBLE REFERENCE ELEVATIONS, AS NEEDED.
2. INSTALL EROSION AND SEDIMENT CONTROL MEASURES CONSISTENT WITH OVERALL DEVELOPMENT E&S PLAN.
3. STABILIZE THE GRADING AROUND THE PROPOSED AREA AND DIVERT RUNOFF AWAY FROM THE PROPOSED EXCAVATIONS.
4. EXCAVATE THE BIORETENTION AREA TO THE PROPOSED LINES AND GRADES SHOWN ON THE SITE PLANS, AND SCARIFY THE EXISTING SOIL SURFACES, TAKING CARE NOT TO COMPACT THE IN-SITU SOILS.
5. INSTALL THE UNDERDRAIN SYSTEM AND OVERFLOW STRUCTURES. INSTALL THE FABRIC ON THE SIDEWALLS AND STAKE IN PLACE.
6. BACKFILL THE EXCAVATIONS WITH THE SOIL MIXTURE AS SHOWN ON THE PLANS AND SPECIFIED HEREIN.
7. FINISH GRADING THE SURFACE OF THE BIORETENTION AREA. LEAVE ROOM FOR THREE (3) INCHES OF WOOD CHIP MULCH.
8. PRESOAK THE PLANTING MIXTURE PRIOR TO PLACEMENT OF PLANTING STOCK. ALLOW THE SOIL MIXTURE TO SETTLE NATURALLY BEFORE PLACING THE PLANTS.
9. PLANT VEGETATION WITHIN THE BIORETENTION AREA AS SPECIFIED IN THE PLANTING NOTES AND LANDSCAPE PLANS (PROVIDED BY OTHERS).
10. MULCH THE SURFACE WITH NOT MORE THAN THREE (3) INCHES OF SINGLE PASS, HARDWOOD MULCH. REMOVE TEMPORARY SEDIMENT CONTROLS AND ANY ENTRANCE BLOCKS TO THE BIORETENTION AREA AFTER ACCEPTANCE BY THE DESIGN PROFESSIONAL AND THE LOCAL REGULATORY AUTHORITY.

BIORETENTION AREA

TREATMENT OF STORMWATER RUNOFF IS ACCOMPLISHED IN PROPOSED BIORETENTION AREA BY MEANS OF INFILTRATION USING PLANTING SOILS. PLANTINGS OF NATIVE VEGETATION WITHIN THE BIORETENTION AREA MAINTAIN THE INFILTRATIVE CAPACITY OF THE SYSTEM, PROVIDE SOIL STABILIZATION, AND THE ATTENUATE NUTRIENTS AND OTHER CONTAMINANTS. MANAGEMENT ACTIONS INCLUDE THE FOLLOWING:

1. ANNUAL INSPECTION AND REPAIR OF OR REPLACEMENT OF TREATMENT COMPONENTS.
2. TWICE PER YEAR (SPRING AND FALL) INSPECT TREES AND SHRUBS TO EVALUATE HEALTH, REMOVE AND REPLACE DEAD OR DYING PLANTS, AND PRUNE DISEASED OR BROKEN PLANTS.
3. TREATMENT OF DISEASED VEGETATION WITH APPROPRIATE LOW-TOXICITY CHEMICALS (HERBICIDES, PESTICIDES).
4. WEED ANNUALLY AND PRUNE SHRUB VEGETATION UNTIL VEGETATION IS ESTABLISHED TO IMPROVE APPEARANCE.
5. REPLACE MULCH TO COVER EXPOSED SOIL AREA. REMOVE AND REPLACE MULCH EVERY TWO TO THREE YEARS. MULCH DEPTH NOT TO EXCEED THREE (3) INCHES.
6. SAMPLE SOIL FOR FERTILITY EVERY THREE YEARS. ADDITION OF LIMESTONE ONE OR TWO TIMES PER YEAR TO MAINTAIN PROPER PH IS RECOMMENDED. FIELD OR LABORATORY TESTING FOR PH IS ACCEPTABLE.
7. CHECK BASIN FOR SEDIMENT BUILD UP AND REMOVE SEDIMENT IF GREATER THAN ONE INCH.
8. CHECK BASIN AFTER STORM EVENT TO ENSURE THAT IT DEWATERS PROPERLY (DRAINS WITHIN 48HRS).
9. CHECK OUTLET OVERFLOW FOR EVIDENCE OF BLOCKAGE AND SOIL EROSION AT DISCHARGE POINTS. CLEAN BLOCKAGES AS REQUIRED AND STABILIZE EROSIVE AREAS AS NEEDED.

GENERAL CONSTRUCTION SPECIFICATIONS

1. SOILS
SOIL FILTER MIXTURE - A SOIL MIXTURE OF 50-60% MASONS SAND (ASTM C-33) WITH GRAIN SIZE OF 0.02-0.04", 20-30% WEED FREE LEAF COMPOST WITHOUT MANURE, AND 20-30% WEED FREE TOPSOIL WITH LESS THAN 5% CLAY SHALL BE USED TO FILL THE BIORETENTION EXCAVATION. THE SOIL SHALL BE FREE OF STONES, STUMPS, ROOTS OR SIMILAR OBJECTS LARGER THAN 2". NO OTHER MATERIALS SHALL BE MIXED IN WITH THE SOIL THAT MAY BE HARMFUL TO PLANT GROWTH OR PROVE A HINDRANCE TO THE PLANTING OR MAINTENANCE OPERATIONS. SOIL MIXTURE DEPTH SHALL BE 21" DEEP.

PRIOR TO PLACEMENT OF THE SOIL MEDIUM A CERTIFICATE FROM AN ACCREDITED LABORATORY MUST BE SUBMITTED TO THE DESIGN PROFESSIONAL ATTESTING TO THE SOIL'S PHYSICAL PROPERTIES (SIEVE ANALYSIS), CHEMICAL NATURE (PH AND FERTILITY) AND WEED FREE NATURE (GROW-OUT TEST). WEED FREE MEANS THE SOIL MEDIUM DOES NOT CONTAIN PLANTS OR SEEDS OF BERMUDA GRASS, QUACKGRASS, JOHNSON GRASS, MUGWORT, NUTSEDGE, POISON IVY, CANADIAN THISTLE, TEARTHUMB, OR OTHER NOXIOUS OR INVASIVE WEEDS AS DEFINED BY THE MOST RECENT LISTING PUBLISHED BY THE STATE OF NEW YORK.

THE EXCAVATED SOIL SURFACE SHALL BE SCARIFIED AND THE SOIL MIXTURE SHALL BE PLACED IN 8-12" LIFTS TAKING CARE NOT TO COMPACT THE EXISTING SOIL OR THE SOIL MIXTURE. LIFTS MAY BE LIGHTLY WATERED TO ENCOURAGE NATURAL COMPACTION. ANTICIPATE 20% COMPACTION OF THE SOIL MIXTURE FOLLOWING NATURAL COMPACTION. DEPRESSIONS GREATER THAN 6" BELOW THE FINISHED SURFACE OF THE AREA CAN BE FILLED WITH ADDITIONAL SOIL MIXTURE AND COVERED WITH 3" (MAXIMUM) LAYER OF "SINGLE PASS" HARDWOOD CHIP MULCH.

SOIL PH: SOIL PH RANGE SHALL BE 5.5 - 6.5.

ORGANIC MATTER CONTENT: 1.5-3.0 % BY DRY WEIGHT.

2. UNDERDRAIN
PERFORATED HDPE PIPE SURROUNDED BY WASHED STONE SHALL BE PLACED BENEATH THE BIORETENTION AREA. ALL DRAINS SHALL CONNECT TO THE DRAINAGE SYSTEM AND SHALL DISCHARGE AS SHOWN ON SITE PLAN.

3. PEA GRAVEL DIAPHRAGM
A PEA GRAVEL DIAPHRAGM, SIX (6) INCHES (MINIMUM) IN DEPTH, SHALL BE PLACED OVER THE UNDERDRAIN AND EXTEND ONE (1) FOOT TO EITHER SIDE OF THE EDGE OF THE DRAIN. PEA GRAVEL SHALL BE 1/4-1/2" DIAMETER.

4. FILTER FABRIC
FILTER FABRIC SHALL BE A NON-WOVEN TYPE (ASTM D-4491) HAVING A MINIMUM FLOW RATE OF 125 GALS/MIN/FT2. MULLEN BURST STRENGTH OF 400 PSI (ASTM D-1117), TENSILE STRENGTH OF 300 LBS (ASTM D-1682), 0.08" THICK, E.O.S. #80. THE FABRIC SHALL BE PRE-APPROVED BY THE DESIGN PROFESSIONAL PRIOR TO USE. FABRIC SHALL BE PLACED ON THE SIDEWALLS (FROM SUBGRADE LEVEL AND OVER THE STONE LAYER). FABRIC SHALL BE OVERLAPPED BY 1-FOOT (MINIMUM) AT THE ENDS AND STAKED IN PLACE DURING CONSTRUCTION AT THE TURNED UP SURFACES. EXCESS FABRIC MAY BE REMOVED BY CUTTING ALONG THE DESIRED ELEVATIONS.

5. MULCH
ONLY FRESH, SINGLE PASS, SHREDDED HARDWOOD MULCH SHALL BE USED TO MULCH THE SURFACE OF THE BIORETENTION AREA. MULCH SHALL BE PLACED TO A MAXIMUM HEIGHT OF 3" OVER THE ENTIRE SURFACE OF THE BIORETENTION AREA'S FINISHED SURFACE AFTER PLANTS ARE INSTALLED. MULCH SHALL BE FREE OF FOREIGN MATERIALS INCLUDING PLANT MATERIALS AND WELL AGED (STOCKPILED FOR GREATER THAN 12 MONTHS). PROTECT AND LIFT GROUND COVER PLANTS TO PLACE THE MULCH MATERIAL BENEATH AND IN BETWEEN THE PLANTINGS.

CMX
W. CHARLES UTSCHIG, JR.

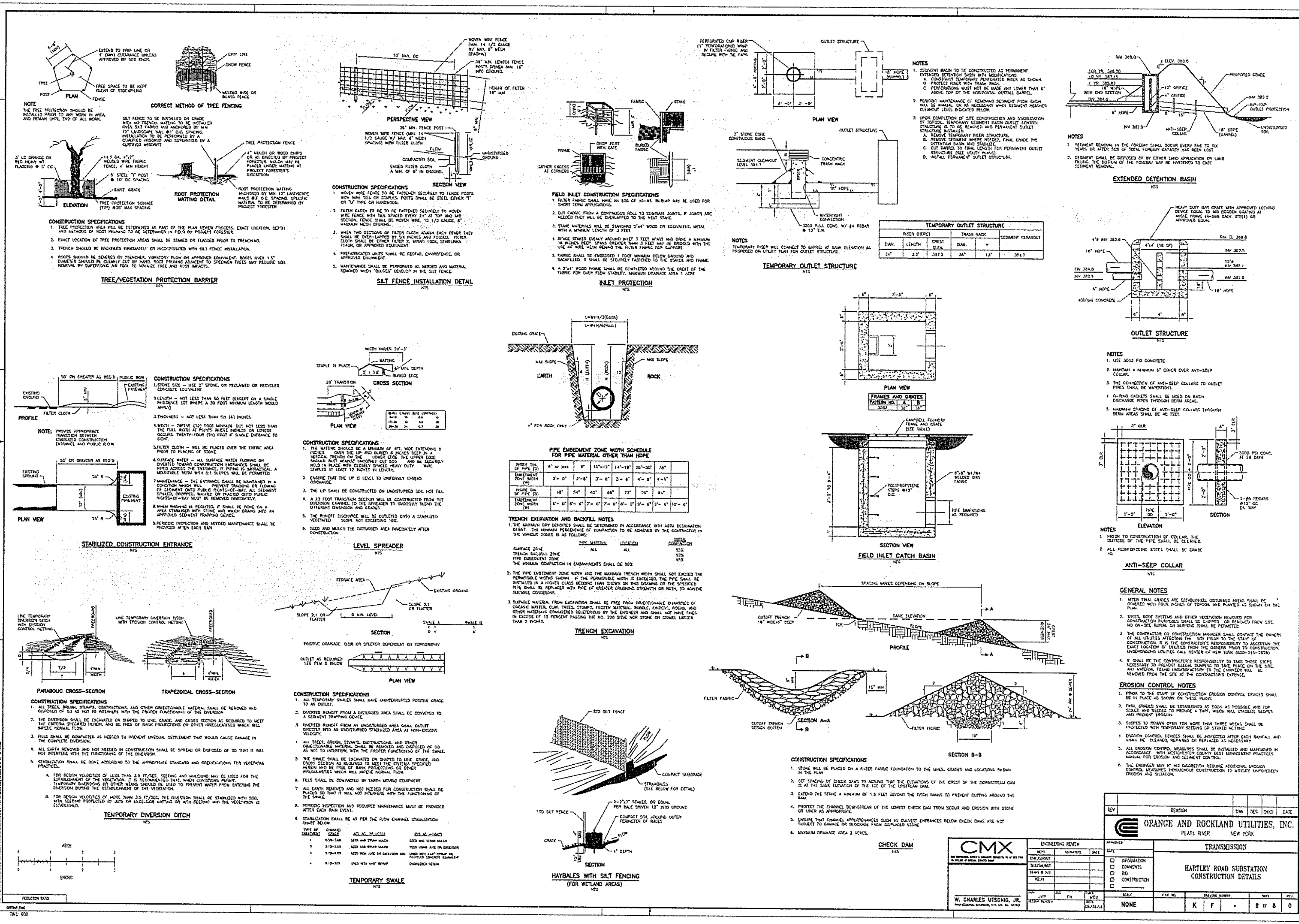
REV	REVISION	DWN	DES	CHKD	DATE

ORANGE AND ROCKLAND UTILITIES, INC.
PEARL RIVER NEW YORK
TRANSMISSION

HARTLEY ROAD SUBSTATION
ROAD PROFILES AND
CONSTRUCTION DETAILS

ENGINEERING REVIEW
INFORMATION / COMMENTS / BID / CONSTRUCTION

SCALE: AS SHOWN
DRAWING NUMBER: K F - 7 of 8
REV: 0



TREE/VEGETATION PROTECTION BARRIER
CORRECT METHOD OF TREE FENCING
ROOT PROTECTION MATTING DETAIL
SILT FENCE INSTALLATION DETAIL
INLET PROTECTION
TEMPORARY OUTLET STRUCTURE
EXTENDED DETENTION BASIN
OUTLET STRUCTURE
STABILIZED CONSTRUCTION ENTRANCE
LEVEL SPREADER
PIPE EMBEDMENT ZONE WIDTH SCHEDULE FOR PIPE MATERIAL OTHER THAN HDPE
TRENCH EXCAVATION
FIELD INLET CATCH BASIN
ANTI-SEEP COLLAR
GENERAL NOTES
EROSION CONTROL NOTES
TEMPORARY DIVERSION DITCH
TEMPORARY SWALE
HAYBALES WITH SILT FENCING (FOR WETLAND AREAS)
CHECK DAM
CMX
W. CHARLES UTSCHIG, JR.
ORANGE AND ROCKLAND UTILITIES, INC.
PEARL RIVER NEW YORK
TRANSMISSION
HARTLEY ROAD SUBSTATION
CONSTRUCTION DETAILS
NONE
K F 8 OF 8 0

CMX

Re: Hartley Road Substation/ SWPPP AREAS **Date:** August, 2011

Total Area	324,362.18 S.F.	7.446 AC.

PRE-DEVELOPMENT						
	Impervious Area			Pervious Area		
		S.F.	AC.		S.F.	AC.
Subarea 1	Buildings/concrete	0.00	0.000	Woods	87,533.90	2.010
	Gravel areas	0.00	0.000	Grass/pasture	229,561.44	5.270
	Paved roadway	7,266.84	0.167		0.00	0.000
324,362.18 sf	Rock outcrop	0.00	0.000		0.00	0.000
7.446 AC.		0.00	0.000		0.00	0.000
Totals:		**7,266.84**	**0.167**		**317,095.34**	**7.280**

POST-DEVELOPMENT						
	Impervious Area			Pervious Area		
		S.F.	AC.		S.F.	AC.
Subarea 1A	Buildings/concrete	2,020.95	0.046	Grass/pasture	26,110.02	0.599
	Gravel areas	24,695.78	0.567	Lawns	50,056.51	1.149
	Paved access rd	19,600.05	0.450		0.00	0.000
131,379.88 sf	Gavel access rd	8,896.57	0.204		0.00	0.000
3.016 AC.		0.00	0.000		0.00	0.000
Totals:		**55,213.35**	**1.268**		**76,166.53**	**1.749**
	Impervious Area			Pervious Area		
		S.F.	AC.		S.F.	AC.
Subarea 1B	Buildings/concrete	0.00	0.000	Grass/pasture	0.00	0.000
	Gravel areas	0.00	0.000	Lawns	35,936.87	0.825
	Paved roadway	6,695.74	0.154		0.00	0.000
42,632.61 sf	Gavel access rd	0.00	0.000		0.00	0.000
0.979 AC.		0.00	0.000		0.00	0.000
Totals:		**6,695.74**	**0.154**		**35,936.87**	**0.825**
	Impervious Area			Pervious Area		
		S.F.	AC.		S.F.	AC.
Subarea 1C	Buildings/concrete	0.00	0.000	Grass/pasture	84,697.00	1.944
	Gravel areas	0.00	0.000	Lawns	45,440.77	1.043
	Paved access rd	0.00	0.000		0.00	0.000
130,137.77 sf	Gavel access rd	0.00	0.000		0.00	0.000
2.988 AC.		0.00	0.000		0.00	0.000
Totals:		**0.00**	**0.000**		**130,137.77**	**2.988**
	Impervious Area			Pervious Area		
		S.F.	AC.		S.F.	AC.
Subarea 1D	Buildings/concrete	0.00	0.000	Grass/pasture	20,211.92	0.464
	Gravel areas	0.00	0.000	Lawns	0.00	0.000
	Paved access rd	0.00	0.000		0.00	0.000
20,211.92 sf	Gavel access rd	0.00	0.000		0.00	0.000
0.464 AC.		0.00	0.000		0.00	0.000
Totals:		**0.00**	**0.000**		**20,211.92**	**0.464**

WATER QUALITY COMPUTATIONS

Data: (Subarea 1A)

Site Area											3.016 ac		
Offsite Drainage Area											0.000 ac		
A = Total Site Area										=	3.016 ac	=	131,681 s.f.
Ai = Impervious Area at Post Development Condition										=	1.268 ac	=	55,340 s.f.
I = percent Impervious Area =		[(	Ai	)(	100	)]/(	A	)=					
I = percent Impervious Area =		[(	1.268 ac	)(	100	)]/(	3.016 ac	)=			42.03 %		
Rv = Volumetric Runoff Coeff. =		(	0.05	)+[(	0.009	)(	42.03	)]=					
Rv = Volumetric Runoff Coeff. =		(	0.05	)+[(	0.009	)(	42.03	)]=			0.428		
P = Precipitation Depth =											1.2 in.		
WQv = Water Quality Volume =	[(	P	)(	Rv	)(	A	)]/ 12						
WQv (required)	[(	1.2 in.	)(	0.428	)(	3.016 ac	)]/ 12			=	0.129 ac.ft	=	5,626 cf
WQv (provided)										=	**0.145 ac.ft**	=	**6,300 cf**

CHANNEL PROTECTION STORAGE VOLUME COMPUTATIONS (Cp_v).

(Subarea 1A)

P(1yr):	Orange County	2.9	in.
Total Area	(Subarea 1A)	3.016	ac

RUNOFF SUMMARY			
Post development Area	CN	T_c	Runoff(Q_a)*
			1 yr storm
		Hours	in.
Subarea 1A	83.66	0.1000	1.41

*NOTE: Computed utilizing Tr-55 Analysis where $Q_a = (P-I_a)^2/[(P-I_a)+(1000/CN-10)]$

Dev. I_a = (200/CN) - 2 = 0.391

Channel Protection(Cp_v):

Determine Watershed Classification:

The extended detention time is 24 hrs.

T:	24 hr
Dev. I_a/P (1yr.):	0.135
T_c:	0.100 hr

Using Exhibit 4-III TR-55 SCS Graphical Method of determining peak discharge (q_u) in csm/in for 24-Hour Type III Storm Distribution with the above I_a/p and T_c, a q_u is determined.

q_u = 450

Using Figure 8.5 Detention Time vs. Discharge Ratios (NYS Stormwater Management Manual) with the above q_u and T, a (q_o/q_i) is determined.

q_o/q_i = 0.040

Compute V_s/V_r for type III rainfall distribution with q_o/q_i.

$V_s/V_r = 0.682 - 1.43(q_o/q_i) + 1.64(q_o/q_i)^2 - 0.804(q_o/q_i)^3 =$ 0.627

Cpv (required) V_s = Cpv = (V_s/V_r)(Q_a dev.)(A)/12 = **0.223 ac-ft**

Cpv (proposed) **0.231 ac-ft** @ **386.60**

COMPUTE ED ORIFICE

		POND 1
Cpv	=	0.231 ac.ft
Average Release rate of Cpv (24 hrs)	=	0.116 cfs
Average Q_{WQv-ED} (from bioretention)	=	0.033 cfs
Cpv_ED	=	0.084 cfs
Cpv. EL. @ **(0.231 ac ft)**	=	386.60 ft
Invert for orifice "EL. at WQv" @	=	384.00 ft
Average head (h) "ft"	=	1.30 ft
Orifice Coefficient	=	0.6
Orifice Area "sf" A=Q/[C(2gh)^0.5)]	=	0.015 sf
Orifice diameter "in"	=	1.68" **USE** NONE

NOTE: No CPv is needed if orifce is less than 3"

CMX

Bioretention Area (NYSDEC F-5)
Data: (Subarea 1A)

Size Infiltration Trench:

From Darcy's Law: Af=WQv(df)/[k(hf+df)(tf)}

WQv		=	5,626.10 cf
k (coefficient of permiability)	Bioretention Soil *	=	2.00 ft/day
hf (Aver. Height of water above filter bed)	**	=	0.50 ft
tf (design filter drain time)		=	2.00 days
Filter depth (df)		=	4.00 ft
Af (Surface area of filter bed)		=	**1,250.24 sf**
Af provided		=	**3,500.00 sf**

** NYS Design Manual Page 6-52*
*** Half of water quality elevation (WQv EL)*

Actual Volume Provided	=	15,750.00 cf

Determine runoff reduction

HSG classification	=	C
Underdrain	=	Yes
RRv capacity	=	40.00 %
RRv Provided	=	6,300.00 cf
Is RRv > WQv?	=	YES

Underdrain Capacity:

Pipe Diameter		=	6.00"
Area (sf)		=	0.196 sf
Hyd. R			0.125
Slope		=	0.05
n	(PVC)	=	0.011
Underdrain design flow			0.15 cfs
WQv (release in	2.00 days)	=	0.03 cfs
Pipe Capacity:		=	OK

TEMPORARY SEDIMENT BASIN DESIGN DATA SHEET

Computed by: JP — Date: August, 2011
Pond: Extended Detention Bas — Drainage area: 3.480 ac.
(From Subarea 1A & 1D)

BASIN SIZE DESIGN

1. Minimum sediment storage volume = 134 cu.yds. x 3.480 ac. acres drainage area = 466.32 cu.yds.
Sediment storage volume provided (Final pond to be used for sediment basin)= 1,232.58 cu.yds.

2. a. Cleanout at 50 percent of minimum required volume= 616.29 cu.yds.
b. Elevation corresponding to scheduled time to clean out (@ 0.38 ac.ft) = 384.70'
c. Distance below top of riser ('b.' - bottom of pond ' 384.00') = 0.70'

3. Min. surface area is larger of $0.01Q_{(10)}$ (12.38cfs)= 0.124 or, 0.015 DA= 0.052 ac. use: 0.124 ac.
Surface area provided (Final pond grading to be used for sediment basin)= 0.235 ac.

DESIGN OF SPILLWAYS & ELEVATIONS

Runoff

4. $Q_{p(10)}$= 12.38 cfs *
* Computations shown on section 6 of SWPPP

Pipe Spillway (Q_{ps})

5. Min. pipe spillway cap., Q_{ps} = 0.2 x 3.480 ac.ft = Drainage= 0.70 cfs
Note: If there is no emergency spillway, then req'd Qps=Qp($_{10}$)= 12.38 cfs Spillway NOT used.

6. H= 6.00' Barrel length= 41.00'
7. Barrel: Diam.= **18.0"** **;Qps = (Q)** 20.30 cfs x (cor. fac.) 1.11 = **22.53 cfs**
8. Riser: Diam.= 24.0" ; Length 3.20' ; h= 1.00' Crest Elev. 387.20'
9. Trash Rack: Diam. = 36.0" ; H= 13.0"

From **Figure 5A.29(2)** *New York Standards and Specifications For Erosion and Sediment Control*

Emergency Spillway Design (N/A)

10. Emergency Spillway Flow, $Q_{es} = Q_p - Q_{ps}$ = 12.38 cfs - 0.70 cfs = 11.68 cfs

11				
Width:	0.0'**	; Hp 0.00'	Crest elevation=	0.00'
Provided width:	**0.00'**		Design High Water Elevation=	0.00'
Entrance channel slope	<18.2 %		; Top of Dam Elev.=	0.00'
Exit channel slope	<18.2 %			

** From **Figure 5A.33(2)** *New York Standards and Specifications For Erosion and Sediment Control*

ANTI-SEEP COLLAR/ SEEPAGE DIAPHRAGM DESIGN

Collars:

12. y= 4.20' ; z = 3 ; pipe slope = 1:70% L_s= **31.5 '**
*** Use 2 collars, 20.25 sq.ft. projection = 1.20 ft

*** From **Figure 5A.31(2)** *New York Standards and Specifications For Erosion and Sediment Control*

Diaphragms: (None used)
NA # width , height

DEWATERING ORIFICE SIZING

13. $Ao = \dfrac{A_s \times (2h)^{0.5}}{122,568}$ = 0.10 sq.ft ~ 4.26" dia. ;h= 0.70' therefore use, N/A

Figure 5A.27
Pipe Flow Chart; "n" = 0.013 (USDA - NRCS)

PIPE FLOW CHART n = 0.013

FOR REINFORCED CONCRETE PIPE INLET $K_m = K_e + K_b = 1.00$ AND 70 FEET OF REINFORCED CONCRETE PIPE CONDUIT (full flow assumed)

Note correction factors for pipe lengths other than 70 feet

diameter of pipe in inches

H, in feet	12"	15"	18"	21"	24"	30"	36"	42"	48"	54"	60"	66"	72"	78"	84"	90"	96"	102"
1	3.22	5.44	8.29	11.8	15.9	26.0	38.6	53.8	71.4	91.5	114	139	167	197	229	264	302	342
2	4.55	7.69	11.7	16.7	22.5	36.8	54.6	76.0	101	129	161	197	236	278	324	374	427	483
3	5.57	9.42	14.4	20.4	27.5	45.0	66.9	93.1	124	159	198	241	289	341	397	458	523	592
4	6.43	10.9	16.6	23.5	31.8	52.0	77.3	108	143	183	228	278	334	394	459	529	604	683
5	7.19	12.2	18.5	26.3	35.5	58.1	86.4	120	160	205	255	311	373	440	513	591	675	764
6	7.88	13.3	20.3	28.8	38.9	63.7	94.6	132	175	224	280	341	409	482	562	647	739	837
7	8.51	14.4	21.9	31.1	42.0	68.8	102	142	189	242	302	368	441	521	607	699	798	904
8	9.10	15.4	23.5	33.3	44.9	73.5	109	152	202	259	323	394	472	557	685	748	854	966
9	9.65	16.3	24.9	35.3	47.7	78.0	116	161	214	275	342	418	500	590	688	793	905	1025
10	10.2	17.2	26.2	37.2	50.2	82.2	122	170	226	289	361	440	527	622	725	836	954	1080
11	10.7	18.0	27.5	39.0	52.7	86.2	128	178	237	304	379	462	553	653	761	877	1001	1133
12	11.1	18.9	28.7	40.8	55.0	90.1	134	186	247	317	395	482	578	682	794	916	1045	1184
13	11.6	19.6	29.9	42.4	57.3	93.7	139	194	257	330	411	502	601	710	827	953	1088	1232
14	12.0	20.4	31.0	44.1	59.4	97.3	145	201	267	342	427	521	624	736	858	989	1129	1278
15	12.5	21.1	32.1	45.6	61.5	101	150	208	277	354	442	539	646	762	888	1024	1169	1323
16	12.9	21.8	33.2	47.1	63.5	104	155	215	286	366	457	557	667	787	917	1057	1207	1367
17	13.3	22.4	34.2	48.5	65.5	107	159	222	294	377	471	574	688	812	946	1090	1244	1409
18	13.7	23.1	35.2	49.9	67.4	110	164	228	303	388	484	591	708	835	973	1121	1280	1450
19	14.0	23.7	36.1	51.3	69.2	113	168	234	311	399	497	607	727	858	1000	1152	1315	1489
20	14.4	24.3	37.1	52.6	71.0	116	173	240	319	409	510	623	746	880	1026	1182	1350	1528
21	14.7	24.9	38.0	53.9	72.8	119	177	246	327	419	523	638	764	902	1051	1211	1383	1566
22	15.1	25.5	38.9	55.2	74.5	122	181	252	335	429	535	653	782	923	1076	1240	1415	1603
23	15.4	26.1	39.8	56.5	76.2	125	186	258	342	439	547	668	800	944	1100	1268	1447	1639
24	15.8	26.7	40.6	57.7	77.8	127	189	263	350	448	559	682	817	964	1123	1295	1478	1674
25	16.1	27.2	41.5	58.9	79.4	130	193	269	357	458	571	696	834	984	1147	1322	1509	1708
26	16.4	27.7	42.3	60.0	81.0	133	197	274	364	467	582	710	850	1004	1169	1348	1539	1742
27	16.7	28.3	43.1	61.2	82.5	135	201	279	371	476	593	723	867	1023	1192	1373	1568	1775
28	17.0	28.8	43.9	62.3	84.1	138	204	285	378	484	604	737	883	1041	1214	1399	1597	1808
29	17.3	29.3	44.7	63.4	85.5	140	208	290	384	493	615	750	898	1060	1235	1423	1625	1840
30	17.6	29.8	45.4	64.5	87.0	142	212	294	391	501	625	763	913	1078	1256	1448	1653	1871
L, in feet	Correction Factors For Other Pipe Lengths																	
20	1.30	1.24	1.21	1.18	1.15	1.12	1.10	1.08	1.07	1.06	1.05	1.05	1.04	1.04	1.03	1.03	1.03	1.03
30	1.22	1.18	1.15	1.13	1.12	1.09	1.08	1.06	1.05	1.05	1.04	1.04	1.03	1.03	1.03	1.02	1.02	1.02
40	1.15	1.13	1.11	1.10	1.08	1.07	1.05	1.05	1.04	1.03	1.03	1.03	1.02	1.02	1.02	1.02	1.02	1.02
50	1.09	1.08	1.07	1.06	1.05	1.04	1.04	1.03	1.03	1.02	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.01
60	1.04	1.04	1.03	1.03	1.03	1.02	1.02	1.02	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
70	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
80	.96	.97	.97	.97	.98	.98	.98	.99	.99	.99	.99	.99	.99	.99	.99	.99	.99	.99
90	.93	.94	.94	.95	.95	.96	.97	.97	.98	.98	.98	.98	.98	.99	.99	.99	.99	.99
100	.90	.91	.92	.93	.93	.95	.95	.96	.97	.97	.97	.98	.98	.98	.98	.98	.98	.99
120	.84	.86	.87	.89	.90	.91	.93	.94	.94	.95	.96	.96	.96	.97	.97	.97	.97	.98
140	.80	.82	.83	.85	.86	.88	.90	.91	.92	.93	.94	.94	.95	.95	.96	.96	.96	.97
160	.76	.78	.80	.82	.83	.86	.88	.89	.90	.91	.92	.93	.94	.94	.95	.95	.95	.96

Figure 5A.25
Riser Inflow Chart (USDA - NRCS)

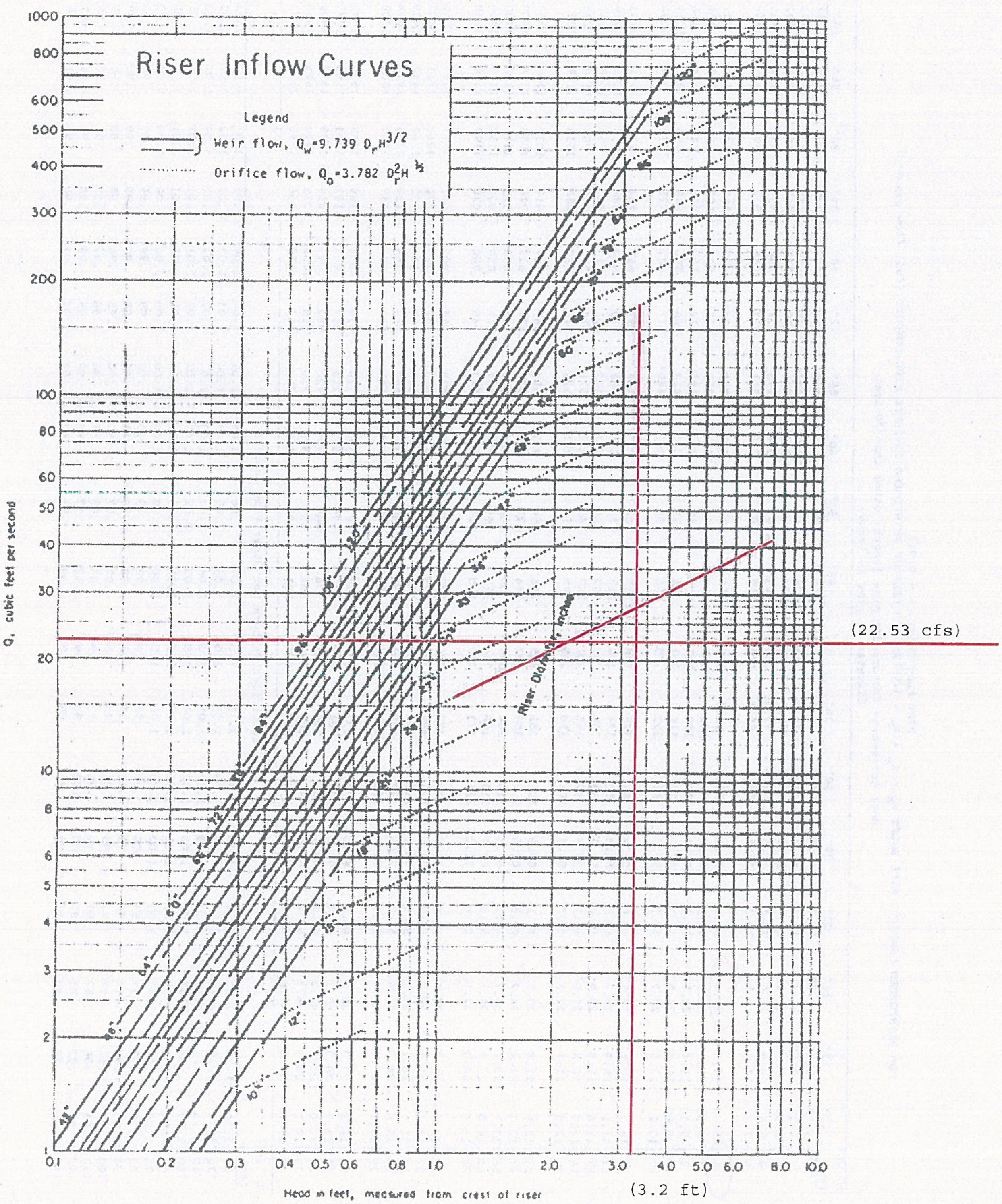
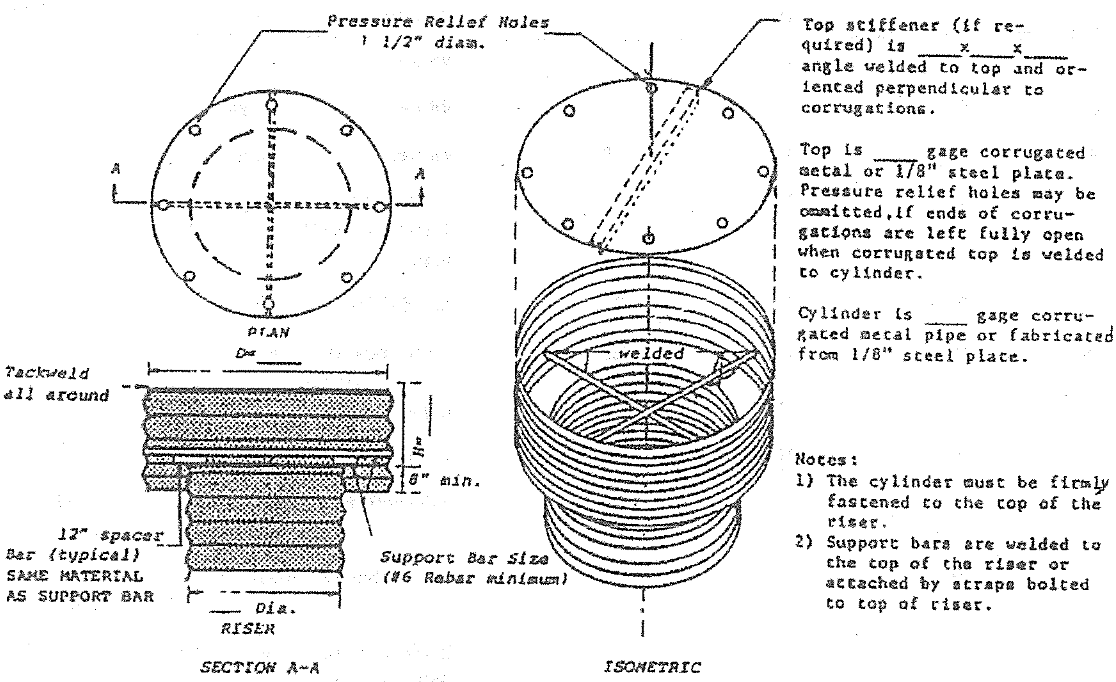


Figure 5A.29(2)
Concentric Trash Rack and Anti-Vortex Device Design Table
(USDA - NRCS)

Riser Diam.(in)	Cylinder Diam (in.)	Thick. Gage	H (in.)	Minimum Size Support Bar	Minimun Top Thickness	Minimun Top Stiffener
12	18	16	6	#6 Rebar	16 ga.	—
15	21	16	7	#6 Rebar	16 ga.	—
18	27	16	8	#6 Rebar	16 ga.	—
21	30	16	11	#6 Rebar	16 ga.	—
24	36	16	13	#6 Rebar	14 ga.	—
27	42	16	15	#6 Rebar	14 ga.	—
36	54	14	17	#8 Rebar	12 ga.	—
42	60	14	19	#8 Rebar	12 ga.	—
48	72	12	21	1 1/4" pipe or 1 1/4x1 1/4x1/4 angle	10 ga.	—
54	78	12	25	See 48" Riser	10 ga.	—
60	90	12	29	1 1/2" pipe or 1 1/2x1 1/2x1/2 angle	8 ga.	—
66	96	10	33	2" pipe or 2x2x3/16 angle	8 ga. w/stiffener	2x2x1/4 angle
72	102	10	36	——See 66" Riser——		2 1/2x2 1/2x1/4 angle
78	114	10	39	2 1/2" pipe or 2x2x1/4 angle	See 72" Riser	See 72" Riser
84	120	10	42	2 1/2" pipe or 2 1/2x2 1/2x1/4 angle	See 72" Riser	2 1/2x 2 1/2x 5/16 angle

Note: The criteria for sizing the cylinder is that the area between the inside of the cylinder and the outside of the riser is equal to or greater than the area inside the riser. Therefore, the above table is invalid for use with concrete pipe risers.

Figure 5A.29(1)
Concentric Trash Rack and Anti-Vortex Device
(USDA - NRCS)



CONCENTRIC TRASH RACK AND ANTI-VORTEX DEVICE
(not to scale)

Figure 5A.31(1)
Anti-Seep Collar Design

This procedure provides the anti-seep collar dimensions for only temporary sediment basins to increase the seepage length by 15% for various pipe slopes, embankment slopes and riser heights.

The first step in designing anti-seep collars is to determine the length of pipe within the saturated zone of the embankment. This can be done graphically or by the following equation, assuming that the upstream slope of the embankment intersects the invert of the pipe at its upstream end. (See embankment-invert intersection on the drawing below:

$$L_s = y\,(z + 4)\left[1 + \frac{\text{pipe slope}}{0.25\text{-pipe slope}}\right]$$

Where: L_s = length of pipe in the saturated zone (ft.)

y = distance in feet from upstream invert of pipe to highest normal water level expected to occur during the life of the structure, usually the top of the riser.

z = slope of upstream embankment as a ratio of z ft. horizontal to one ft. vertical.

pipe slope = slope of pipe in feet per foot.

This procedure is based on the approximation of the phreatic line as shown in the drawing below:

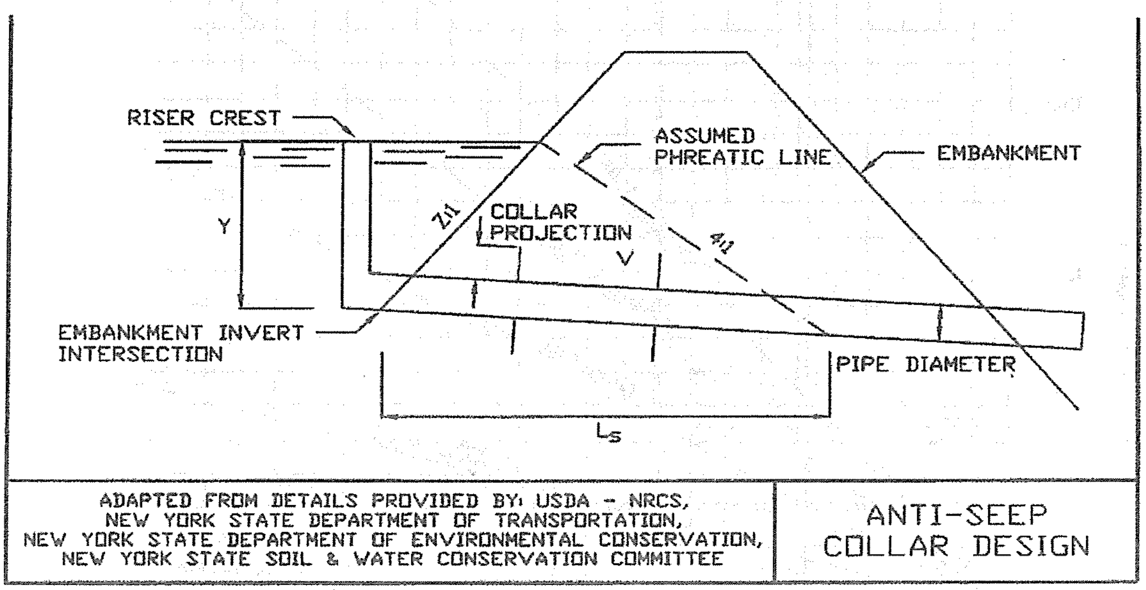


Figure 5A.31(2)
Anti-Seep Collar Design Charts (USDA - NRCS)

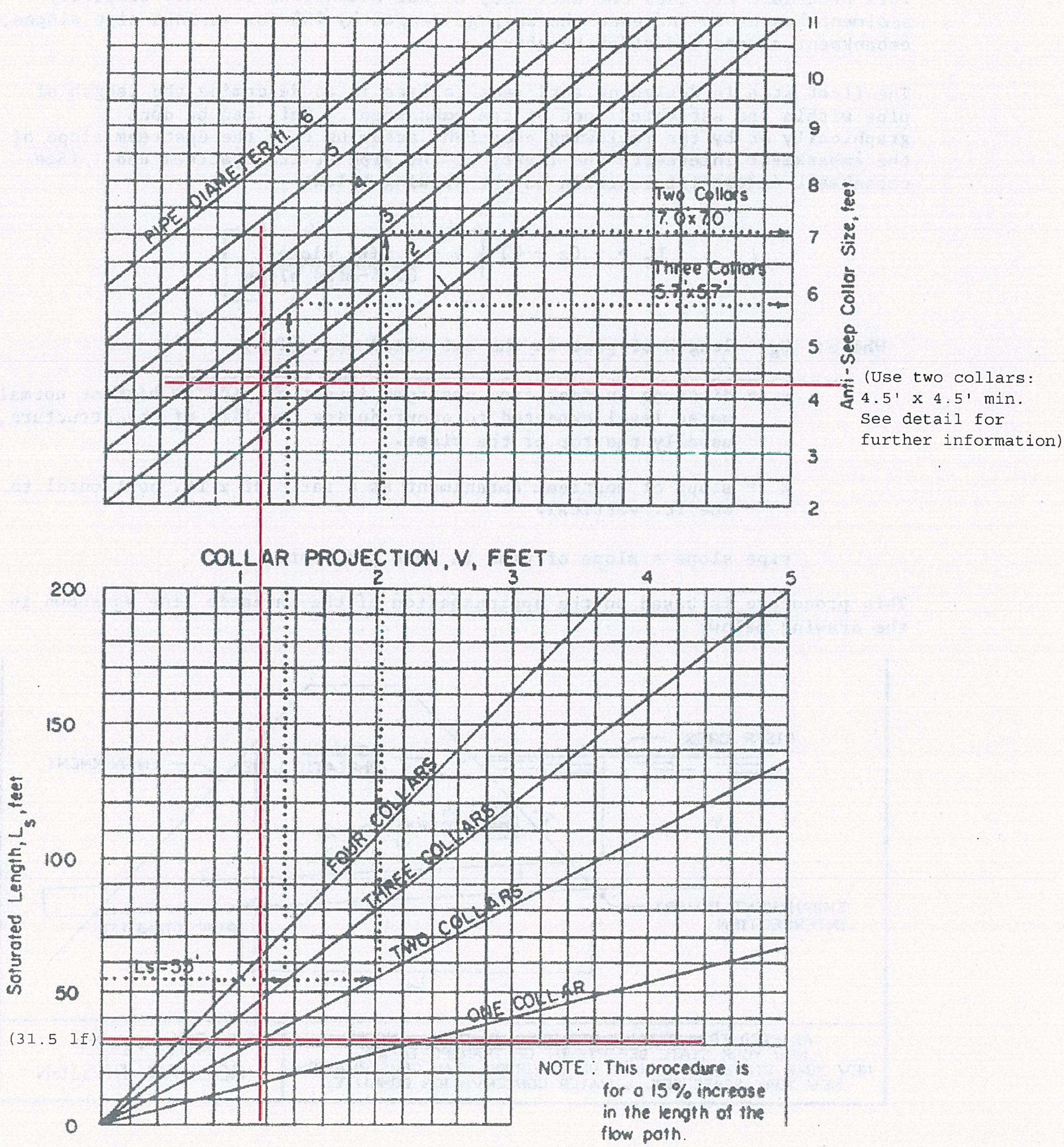
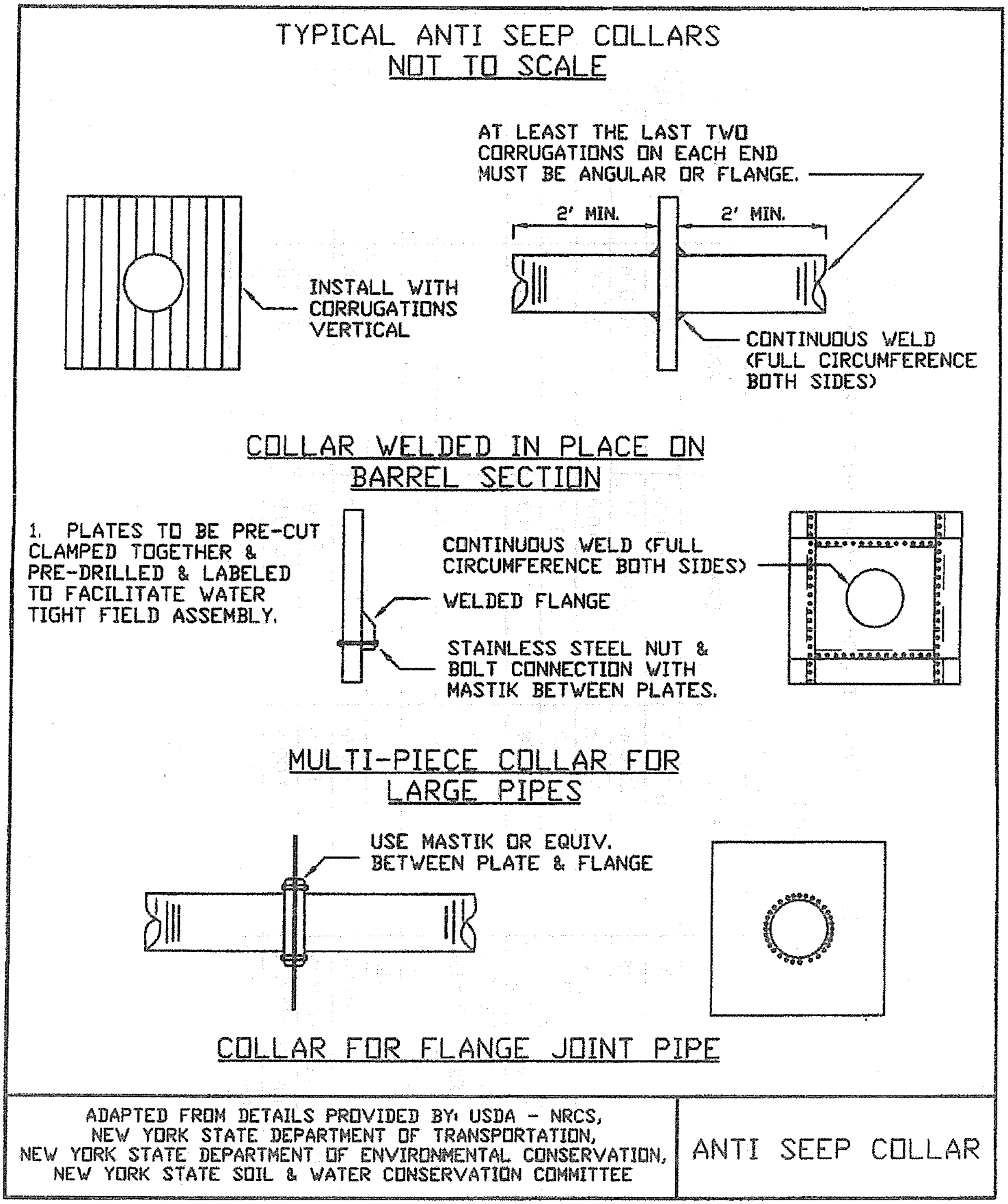


Figure 5A.32
Anti-Seep Collar Design



RE: Rock Outlet Protection/ End Sections (Maximum Tailwater Condition)

Date: August, 2011

	ES-1 & ES-2	ES-6	ES-8	ES-9 & 10
Q*=	5.71 cfs	17.89 cfs	10.55 cfs	13.65 cfs
Pipe dia.=	15.0 in	24.0 in ***	18.0 in	24.0 in ***
d_{50} **=	0.10 ft	0.10 ft	0.10 ft	0.00 ft
	1.2"	1.2"	1.2"	0.0"
Apron length (L_a)**=	*2.0 ft*	*2.0 ft*	*8.0 ft*	*0.0 ft*
Apron width (W)= diam. + 0.4 La=	*2.1 ft*	*2.8 ft*	*4.7 ft*	*2.0 ft*
Use:				
d_{50}=	4 in	4 in	4 in	4 in
dmax=	6.0 in	6.0 in	6.0 in	6.0 in
Min.blanket thickness=	9.0 in	9.0 in	9.0 in	9.0 in
Apron length (L_a)=	4.00 ft	4.00 ft	8.00 ft	8.00 ft
Apron width (W)=	3.00 ft	4.00 ft	5.00 ft	5.00 ft

* 100-year storm event

**(Figure 5B.13, NY Standards and Specifications For Erosion and Sediment Control, August 2005)

*** Site plans show 2 - 12" pipes

STANDARD AND SPECIFICATIONS FOR ROCK OUTLET PROTECTION

Definition

A section of rock protection placed at the outlet end of the culverts, conduits, or channels.

Purpose

The purpose of the rock outlet protection is to reduce the depth, velocity, and energy of water, such that the flow will not erode the receiving downstream reach.

Scope

This standard applies to the planning, design, and construction of rock riprap and gabions for protection of downstream areas. It does not apply to rock lining of channels or streams.

Conditions Where Practice Applies

This practice applies where discharge velocities and energies at the outlets of culverts, conduits, or channels are sufficient to erode the next downstream reach. This applies to:

1. Culvert outlets of all types.

2. Pipe conduits from all sediment basins, dry storm water ponds, and permanent type ponds.

3. New channels constructed as outlets for culverts and conduits.

Design Criteria

The design of rock outlet protection depends entirely on the location. Pipe outlet at the top of cuts or on slopes steeper than 10 percent, cannot be protected by rock aprons or riprap sections due to re-concentration of flows and high velocities encountered after the flow leaves the apron.

Many counties and state agencies have regulations and design procedures already established for dimensions, type and size of materials, and locations where outlet protection is required. Where these requirements exist, they shall be followed.

Tailwater Depth

The depth of tailwater immediately below the pipe outlet must be determined for the design capacity of the pipe. If the tailwater depth is less than half the diameter of the outlet pipe, and the receiving stream is wide enough to accept divergence of the flow, it shall be classified as a Minimum Tailwater Condition; see Figure 5B.12 on page 5B.25 as an example. If the tailwater depth is greater than half the pipe diameter and the receiving stream will continue to confine the flow, it shall be classified as a Maximum Tailwater Condition; see Figure 5B.13 on page 5B.26 as an example. Pipes which outlet onto flat areas with no defined channel may be assumed to have a Minimum Tailwater Condition; see Figure 5B.12 on page 5B.25 as an example.

Apron Size

The apron length and width shall be determined from the curves according to the tailwater conditions:

Minimum Tailwater – Use Figure 5B.12 on page 5B.25
Maximum Tailwater – Use Figure 5B.13 on page 5B.26

If the pipe discharges directly into a well defined channel, the apron shall extend across the channel bottom and up the channel banks to an elevation one foot above the maximum tailwater depth or to the top of the bank, whichever is less.

The upstream end of the apron, adjacent to the pipe, shall have a width two (2) times the diameter of the outlet pipe, or conform to pipe end section if used.

Bottom Grade

The outlet protection apron shall be constructed with no slope along its length. There shall be no overfall at the end of the apron. The elevation of the downstream end of the apron shall be equal to the elevation of the receiving channel or adjacent ground.

Alignment

The outlet protection apron shall be located so that there are no bends in the horizontal alignment.

Materials

The outlet protection may be done using rock riprap, grouted riprap, or gabions.

Riprap shall be composed of a well-graded mixture of stone size so that 50 percent of the pieces, by weight, shall be larger than the d_{50} size determined by using the charts. A well-graded mixture, as used herein, is defined as a mixture composed primarily of larger stone sizes, but with a sufficient mixture of other sizes to fill the smaller voids between the stones. The diameter of the largest stone size in such a mixture shall be 1.5 times the d_{50} size.

Thickness

The minimum thickness of the riprap layer shall be 1.5 times the maximum stone diameter for d_{50} of 15 inches or less; and 1.2 times the maximum stone size for d_{50} greater than 15 inches. The following chart lists some examples:

D_{50} (inches)	d_{max} (inches)	Minimum Blanket Thickness (inches)
4	6	9
6	9	14
9	14	20
12	18	27
15	22	32
18	27	32
21	32	38
24	36	43

Stone Quality

Stone for riprap shall consist of field stone or rough unhewn quarry stone. The stone shall be hard and angular and of a quality that will not disintegrate on exposure to water or weathering. The specific gravity of the individual stones shall be at least 2.5.

Recycled concrete equivalent may be used provided it has a density of at least 150 pounds per cubic foot, and does not have any exposed steel or reinforcing bars.

Filter

A filter is a layer of material placed between the riprap and the underlying soil surface to prevent soil movement into and through the riprap. Riprap shall have a filter placed under it in all cases.

A filter can be of two general forms: a gravel layer or a plastic filter cloth. The plastic filter cloth can be woven or non-woven monofilament yarns, and shall meet these base requirements: thickness 20-60 mils, grab strength 90-120 lbs; and shall conform to ASTM D-1777 and ASTM D-1682.

Gravel filter blanket, when used, shall be designed by comparing particle sizes of the overlying material and the base material. Design criteria are available in Standard and Specification for Riprap Slope Protection on page 5B.57.

Gabions

Gabions shall be made of hexagonal triple twist mesh with heavily galvanized steel wire. The maximum linear dimension of the mesh opening shall not exceed 4 ½ inches and the area of the mesh opening shall not exceed 10 square inches.

Gabions shall be fabricated in such a manner that the sides, ends, and lid can be assembled at the construction site into a rectangular basket of the specified sizes. Gabions shall be of single unit construction and shall be installed according to manufacturers recommendations.

The area on which the gabion is to be installed shall be graded as shown on the drawings. Foundation conditions shall be the same as for placing rock riprap, and filter cloth shall be placed under all gabions. Where necessary, key, or tie, the structure into the bank to prevent undermining of the main gabion structure.

Maintenance

Once a riprap outlet has been installed, the maintenance needs are very low. It should be inspected after high flows for evidence of scour beneath the riprap or for dislodged stones. Repairs should be made immediately.

Design Procedure

1. Investigate the downstream channel to assure that nonerosive velocities can be maintained.

2. Determine the tailwater condition at the outlet to establish which curve to use.
3. Enter the appropriate chart with the design discharge to

determine the riprap size and apron length required. It is noted that references to pipe diameters in the charts are based on full flow. For other than full pipe flow, the parameters of depth of flow and velocity must be used to adjust the design discharges.

4. Calculate apron width at the downstream end if a flare section is to be employed.

Examples

Example 1: Pipe Flow (full) with discharge to unconfined section.

Given: A circular conduit flowing full.

Q = 280 cfs, diam. = 66 in., tailwater (surface) is 2 ft. above pipe invert (minimum tailwater condition).

Find: Read d_{50} = 1.2 and apron length (L_a) = 38 ft.

Apron width = diam. + L_a = 5.5 + 38 = 43.5 ft.

Use: d_{50} = 15", d_{max} = 22", blanket thickness = 32"

Example 2: Box Flow (partial) with high tailwater

Given: A box conduit discharging under partial flow conditions. A concrete box 5.5 ft. x 10 ft. flowing 5.0 ft. deep,

Q = 600 cfs and tailwater surface is 5 ft. above invert (max. tailwater condition).

Since this is not full pipe and does not directly fit the nomograph assumptions of Figure 7B.13 substitute depth as the diameter, to find a discharge equal to full pipe flow for that diameter, in this case 60 inches.

Since, Q = AV and $A = \frac{\pi D^2}{4}$

First, compute velocity:

V = (Q/A) = (600/(5) (10)) = 12 fps

Then substituting:

$$Q = \frac{\pi D^2}{4} \times V = \frac{3.14\,(5\text{ ft})^2}{4} \times 12\text{ fps} = 236\text{ cfs}$$

At the intersection of the curve d = 60 in. and Q = 236 cfs, read d_{50} = 0.4 ft.

Then reading the d = 60 in. curve, read apron length (L_a) = 40 ft.

Apron width, W = conduit width + (6.4)(L_a) = 10 + (0.4) (40) = 26 ft.

Example 3: Open Channel Flow with Discharge to Unconfined Section

Given: A trapezoidal concrete channel 5 ft. wide with 2:1 side slopes is flowing 2 ft. deep, Q = 180 cfs (velocity = 10 fps) and the tailwater surface downstream is 0.8 ft. (minimum tailwater condition).

Find: Using similar principles as Example 2, compute equivalent discharge for a 2 foot, using depth as a diameter, circular pipe flowing full at 10 feet per second.

Velocity:

$$Q = \frac{\pi\,(2\text{ft})^2}{4} \times 10\text{ fps} = 31.4\text{ cfs}$$

At intersection of the curve, d = 24 in. and Q = 32 cfs, read d_{50} = 0.6 ft.

Then reading the d = 24 in. curve, read apron length (L_a) = 20 ft.

Apron width, W = bottom width of channel + L_a = 5 + 20 = 25 ft.

Example 4: Pipe flow (partial) with discharge to a confined section

Given: A 48 in. pipe is discharging with a depth of 3 ft. Q = 100 cfs, and discharge velocity of 10 fps (established from partial flow analysis) to a confined trapezoidal channel with a 2 ft. bottom, 2:1 side slopes, n = .04, and grade of 0.6%.

Calculation of the downstream channel (by Manning's Equation) indicates a normal depth of 3.1 ft. and normal velocity of 3.9 fps.

Since the receiving channel is confined, the maximum tailwater condition controls.

Find: discharge using previous principles:

$$Q = \frac{\pi\,(3\text{ft})^2}{4} \times 10\text{ fps} = 71\text{ cfs}$$

At the intersection of d = 36 in. and Q = 71 cfs, read d_{50} = 0.3 ft.

Reading the d = 36" curve, read apron length (L_a) = 30 ft.

Since the maximum flow depth in this reach is 3.1 ft., that is the minimum depth of riprap to be maintained for the entire length.

Construction Specifications

1. The subgrade for the filter, riprap, or gabion shall be prepared to the required lines and grades. Any fill required in the subgrade shall be compacted to a density of approximately that of the surrounding undisturbed material.

2. The rock or gravel shall conform to the specified grading limits when installed respectively in the riprap or filter.

3. Filter cloth shall be protected from punching, cutting, or tearing. Any damage other than an occasional small hole shall be repaired by placing another piece of cloth over the damaged part or by completely replacing the cloth. All overlaps, whether for repairs or for joining two pieces of cloth shall be a minimum of one foot.

4. Stone for the riprap or gabion outlets may be placed by equipment. Both shall each be constructed to the full course thickness in one operation and in such a manner as to avoid displacement of underlying materials. The stone for riprap or gabion outlets shall be delivered and placed in a manner that will ensure that it is reasonably homogenous with the smaller stones and spalls filling the voids between the larger stones. Riprap shall be placed in a manner to prevent damage to the filter blanket or filter cloth. Hand placement will be required to the extent necessary to prevent damage to the permanent works.

Figure 5B.13
Outlet Protection Design—Maximum Tailwater Condition
(Design of Outlet Protection from a Round Pipe Flowing Full, Maximum Tailwater Condition: $T_w \geq 0.5D_o$) (USDA - NRCS)

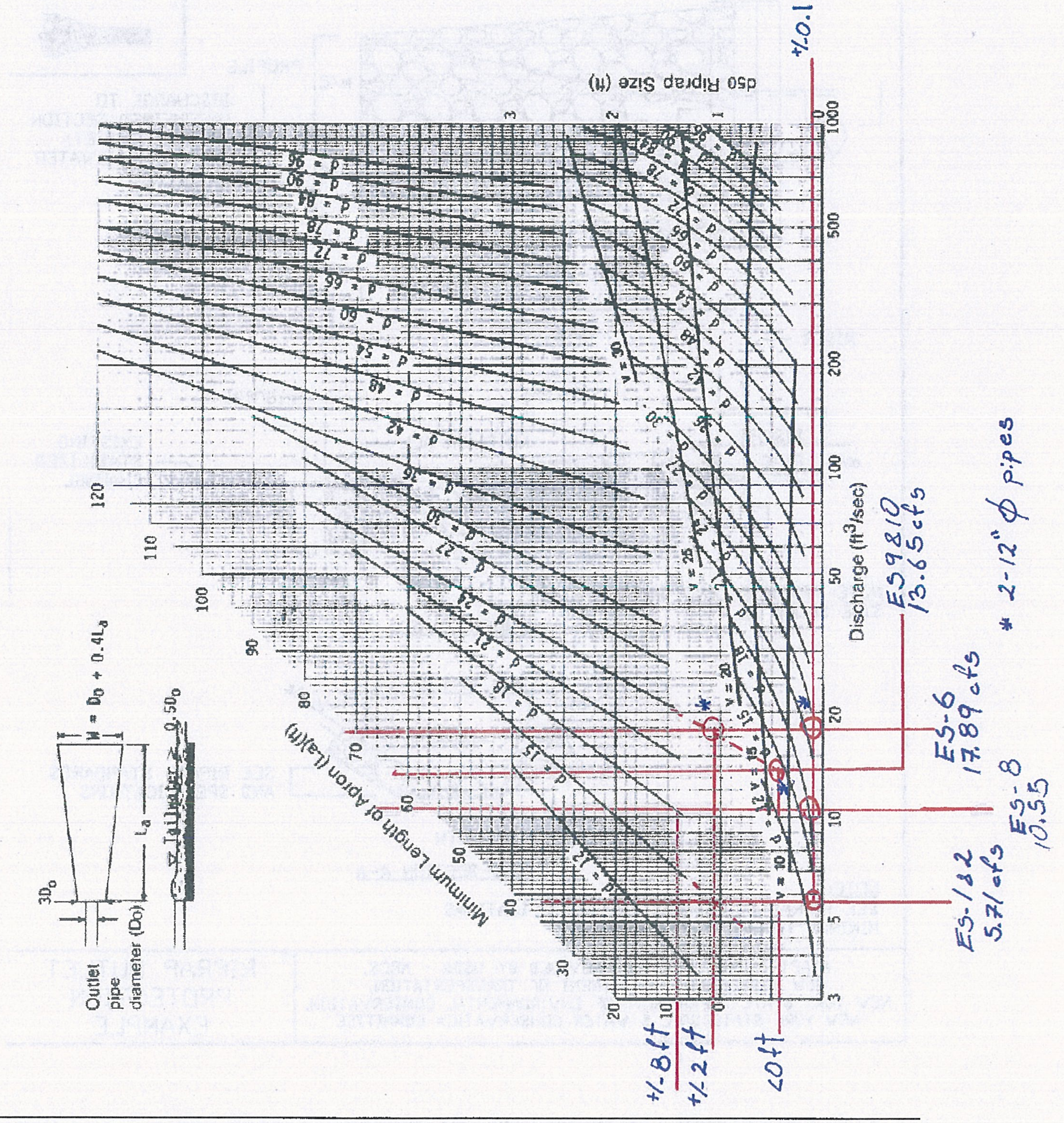
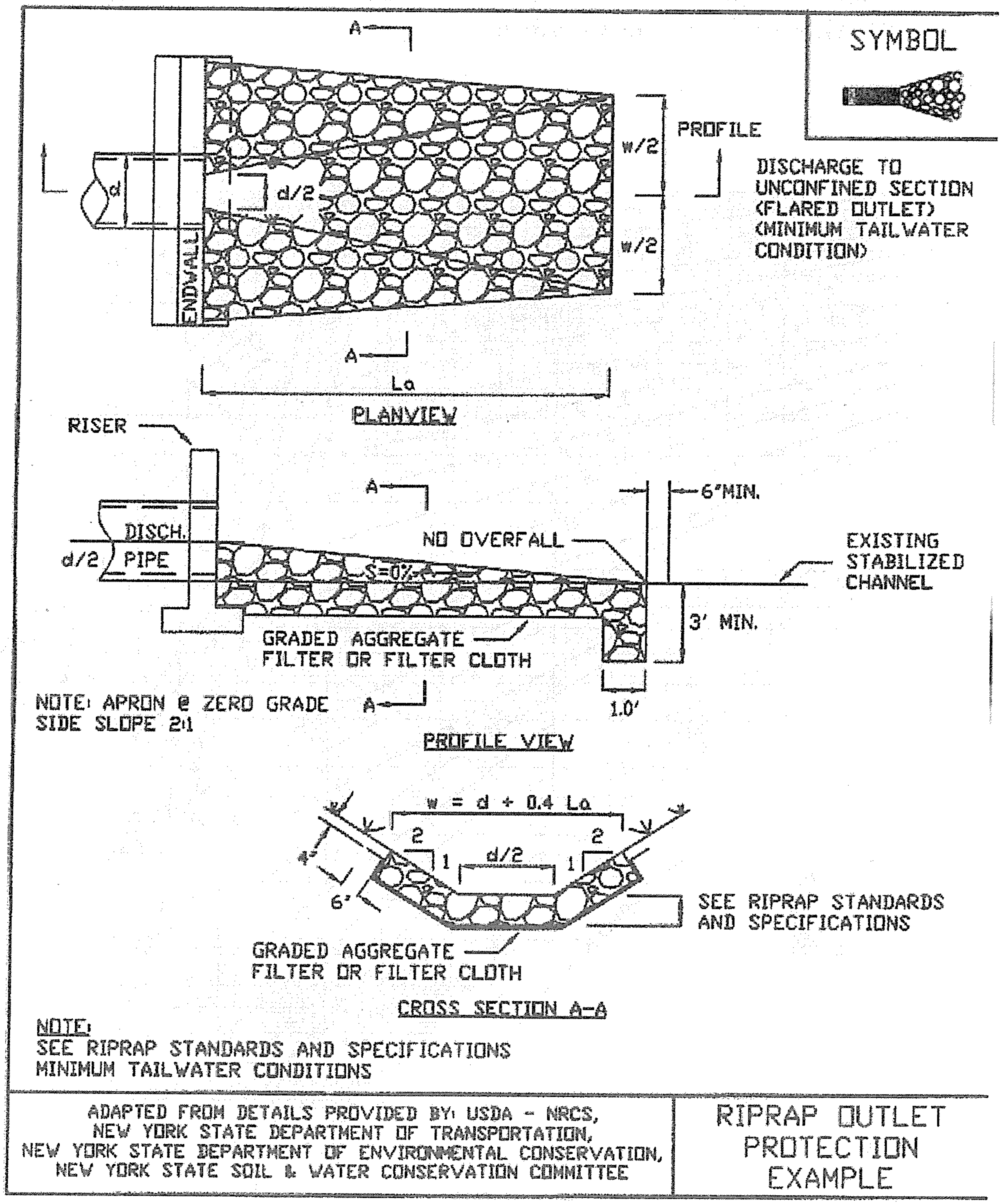


Figure 5B.14
Riprap Outlet Protection Detail (1)



CMX

Pipe Capacity Calculations:
Data: Hartley Road Substation

ES-1 to ES-2

Pipe Diameter		=	15.00"
Area (sf)		=	1.227 sf
Hyd. R		=	0.313
Slope		=	2.70
n	(CMP)	=	0.024
Pipe flow			5.75 cfs
Pipe design flow			
25-yr flow:			4.40 cfs
Pipe Capacity:		=	OK

ES-6

Pipe Diameter		=	12.00"
Area (sf)		=	0.785 sf
Hyd. R		=	0.250
Slope		=	2.80
n	(DIP)	=	0.011
Number of pipes		=	2
Pipe design flow			14.09 cfs
25-yr flow:			13.90 cfs
Pipe Capacity:		=	OK

ES-7 to ES-8

Pipe Diameter		=	18.00"
Area (sf)		=	1.767 sf
Hyd. R		=	0.375
Slope		=	1.70
n	(HDPE)	=	0.012
Pipe design flow			14.84 cfs
25-yr flow:			6.10 cfs
Pipe Capacity:		=	OK

ES-9 to ES-10

Pipe Diameter		=	12.00"
Area (sf)		=	0.785 sf
Hyd. R		=	0.250
Slope		=	1.60
n	(DIP)	=	0.011
Number of pipes		=	2
Pipe design flow			10.65 cfs
25-yr flow:			10.33 cfs
Pipe Capacity:		=	OK

10

PERCOLATION TEST RESULTS

Owner: Orange and Rockland Utilities, Inc. Address: Hartley Road Substation/ Hartley Road

Property Location: Owens Road Sec._____ Block_____ Lot_____

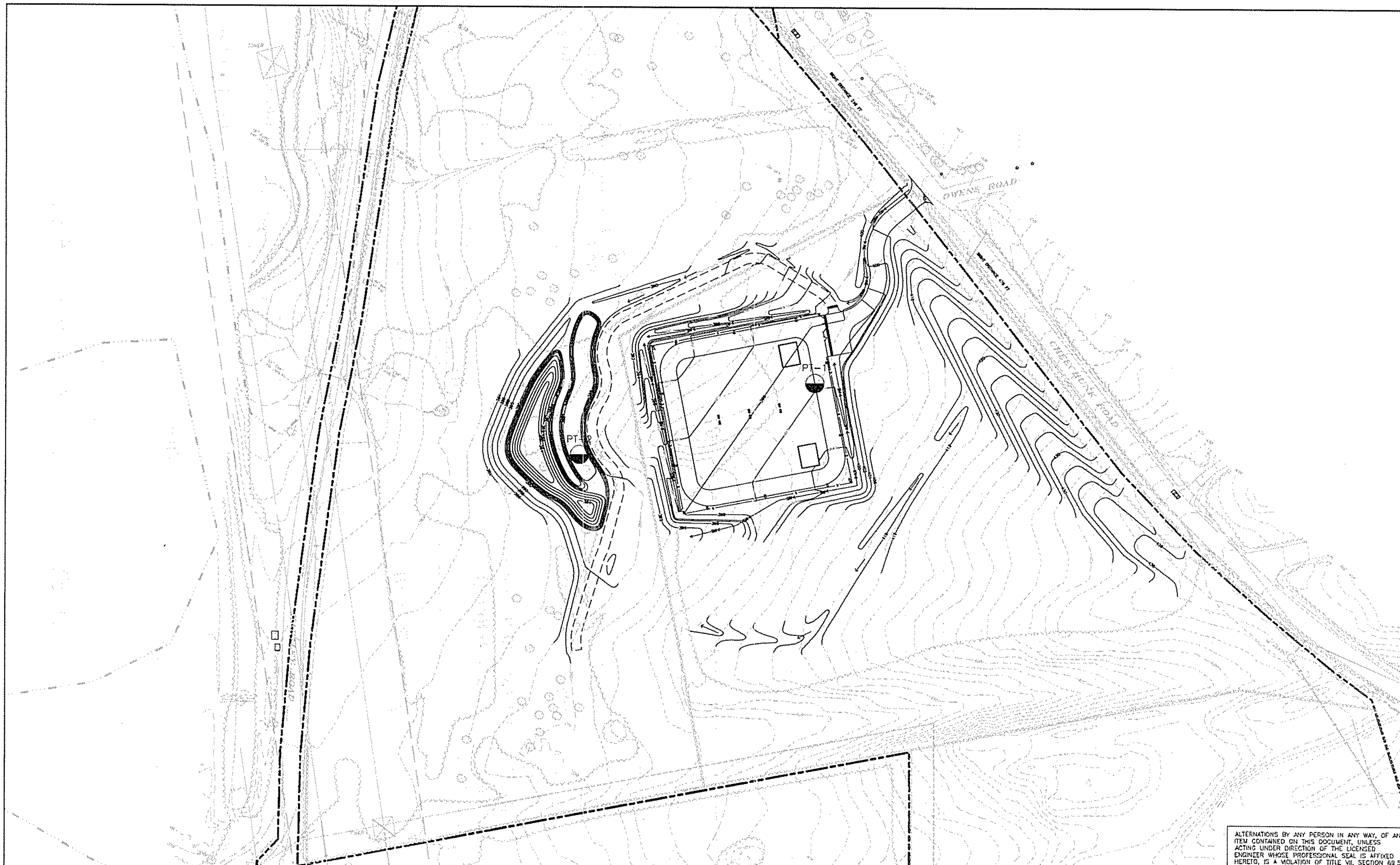
(Indicate nearest cross street)

Municipality: Goshen, Orange County

Presoak Date: 8/09/11 (rain 0.62"), and 8/10/11 (rain 0.06") Run Date: 8/11/11

Hole #		CLOCK TIME			PERCOLATION			
Hole Number	Run No.	Start	Stop	Elapse Time Min.	Depth to Water From Ground Surface Start Inches	Stop Inches	Water Level Drop In Inches	Soil Rate Min/in Drop
PT-1	1	11:46 AM	12:16	30	-	-	1 1/4	24.0
	2	12:16	1:46	30	-	-	1	30.0
	3	1:46	2:16	30	-	-	3/4	40.0
	4	2:16	2:46	30	-	-	3/4	40.0
	5							
PT-2	1	1:15 PM	1:45	30	-	-	2 1/4	13.33
	2	1:45	2:15	30	-	-	2	15.0
	3	2:15	2:45	30	-	-	1 3/4	17.14
	4	2:45	3:15	30	-	-	1 3/4	17.14
	5							
	1							
	2							
	3							
	4							
	5							

Perc test done by: J. Paredes/ CMX



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REVISION NO.	DATE	REVISION

GRAPHIC SCALE IN FEET
N.T.S.

W. CHARLES UTSCHIG, JR.
PROFESSIONAL ENGINEER, N.Y. LIC. No. 62303-1

CMX
CMX ENGINEERING, SURVEY & LANDSCAPE ARCHITECTS, PC OF NEW YORK
AN AFFILIATE OF BIRDSALL SERVICES GROUP

1311 MAMARONECK AVENUE
SUITE 50
WHITE PLAINS, NY 10605
TEL (914)686-1000
FAX (914)686-1222

PERCOLATION TESTS_LOCATION MAP
HARTLEY ROAD SUBSTATION
ORANGE AND ROCKLAND UTILITIES INC.

TOWN OF GOSHEN ORANGE COUNTY NEW YORK

PROJECT NO. 5703120000100	DATE 08/01/11
DRAWN BY JP	DESIGNED BY JP
SCALE N.T.S	CHECKED BY MF
CMX	
SHEET NO. 1 of 1	

11

STATE POLLUTANT DISCHARGE ELIMINATION SYSTEM
FOR CONSTRUCTION ACTIVITIES

CONSTRUCTION SITE LOG BOOK

Table of Contents

Properly completing forms such as those contained in this document meet the inspection requirement of NYSDEC SPDES GP for Construction Activities. Completed forms shall be kept on site at all times and made available to authorities upon request.

I. PRE-CONSTRUCTION MEETING DOCUMENTS

Project Name ____

Permit No. ____________________________ **Date of Authorization** ______________

Name of Operator ____

Prime Contractor ____

a. Preamble to Site Assessment and Inspections -The Following Information To Be Read By All Person's Involved in The Construction of Stormwater Related Activities:

The Operator agrees to have a qualified professional[1] conduct an assessment of the site prior to the commencement of construction[2] and certify in this inspection report that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Prior to the commencement of construction, the Operator shall certify in this site logbook that the SWPPP has been prepared in accordance with the State's standards and meets all Federal, State and local erosion and sediment control requirements.

When construction starts, site inspections shall be conducted by the qualified professional at least every 7 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater (Construction Duration Inspections). The Operator shall maintain a record of all inspection reports in this site logbook. The site logbook shall be maintained on site and be made available to the permitting authorities upon request. The Operator shall post at the site, in a publicly accessible location, a summary of the site inspection activities on a monthly basis (Monthly Summary Report).

The operator shall also prepare a written summary of compliance with this general permit at a minimum frequency of every three months (Operator's Compliance Response Form), while coverage exists. The summary should address the status of achieving each component of the SWPPP.

Prior to filing the Notice of Termination or the end of permit term, the Operator shall have a qualified professional perform a final site inspection. The qualified professional shall certify that the site has undergone final stabilization[3] using either vegetative or structural stabilization methods and that all temporary erosion and sediment controls (such as silt fencing) not needed for long-term erosion control have been removed. In addition, the Operator must identify and certify that all permanent structures described in the SWPPP have been constructed and provide the owner(s) with an operation and maintenance plan that ensures the structure(s) continuously functions as designed.

1 "Qualified Professional means a person knowledgeable in the principles and practice of erosion and sediment controls, such as a Certified Professional in Erosion and Sediment Control (CPESC), soil scientist, licensed engineer or someone working under the direction and supervision of a licensed engineer (person must have experience in the principles and practices of erosion and sediment control).

2 "Commencement of construction" means the initial removal of vegetation and disturbance of soils associated with clearing, grading or excavating activities or other construction activities.

3 "Final stabilization" means that all soil-disturbing activities at the site have been completed and a uniform, perennial vegetative cover with a density of eighty (80) percent has been established or equivalent stabilization measures (such as the use of mulches or geotextiles) have been employed on all unpaved areas and areas not covered by permanent structures.

b. **Operators Certification**

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. Further, I hereby certify that the SWPPP meets all Federal, State, and local erosion and sediment control requirements. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law. "

Name (please print):____

Title ________________________________**Date:**____________

Address: ____

Phone: __________ **Email:**______________________________

Signature:____

c. **Qualified Professional's Credentials & Certification**

" I hereby certify that I meet the criteria set forth in the General Permit to conduct site inspections for this project and that the appropriate erosion and sediment controls described in the SWPPP and as described in the following Pre-construction Site Assessment Checklist have been adequately installed or implemented, ensuring the overall preparedness of this site for the commencement of construction."

Name (please print):____

Title ________________________________**Date:**____________

Address: ____

Phone: __________ **Email:**______________________________

Signature:____

d. Pre-construction Site Assessment Checklist (NOTE: Provide comments below as necessary)

1. Notice of Intent, SWPPP, and Contractors Certification:

Yes No NA

[ ] [ ] [ ] Has a Notice of Intent been filed with the NYS Department of Conservation?
[ ] [ ] [ ] Is the SWPPP on-site? Where?____________________
[ ] [ ] [ ] Is the Plan current? What is the latest revision date?__________
[ ] [ ] [ ] Is a copy of the NOI (with brief description) onsite? Where?__________
[ ] [ ] [ ] Have all contractors involved with stormwater related activities signed a contractor's certification?

Pre-construction Site Assessment Checklist (continued)

2. Resource Protection

Yes No NA

[ ] [ ] [ ] Are construction limits clearly flagged or fenced?

[ ] [ ] [ ] Important trees and associated rooting zones, on-site septic system absorption fields, existing vegetated areas suitable for filter strips, especially in perimeter areas, have been flagged for protection.

[ ] [ ] [ ] Creek crossings installed prior to land-disturbing activity, including clearing and blasting.

3. Surface Water Protection

Yes No NA

[ ] [ ] [ ] Clean stormwater runoff has been diverted from areas to be disturbed.

[ ] [ ] [ ] Bodies of water located either on site or in the vicinity of the site have been identified and protected.

[ ] [ ] [ ] Appropriate practices to protect on-site or downstream surface water are installed.

[ ] [ ] [ ] Are clearing and grading operations divided into areas <5 acres?

4. Stabilized Construction Entrance

Yes No NA

[ ] [ ] [ ] A temporary construction entrance to capture mud and debris from construction vehicles before they enter the public highway has been installed.

[ ] [ ] [ ] Other access areas (entrances, construction routes, equipment parking areas) are stabilized immediately as work takes place with gravel or other cover.

[ ] [ ] [ ] Sediment tracked onto public streets is removed or cleaned on a regular basis.

5. Perimeter Sediment Controls

Yes No NA

[ ] [ ] [ ] Silt fence material and installation comply with the standard drawing and specifications.

[ ] [ ] [ ] Silt fences are installed at appropriate spacing intervals

[ ] [ ] [ ] Sediment/detention basin was installed as first land disturbing activity.

[ ] [ ] [ ] Sediment traps and barriers are installed.

6. Pollution Prevention for Waste and Hazardous Materials

Yes No NA

[ ] [ ] [ ] The Operator or designated representative has been assigned to implement the spill prevention avoidance and response plan.

[ ] [ ] [ ] The plan is contained in the SWPPP on page ______

[ ] [ ] [ ] Appropriate materials to control spills are onsite. Where? ___________________

II. CONSTRUCTION DURATION INSPECTIONS

a. Directions:
Inspection Forms will be filled out during the entire construction phase of the project.
Required Elements:

(1) On a site map, indicate the extent of all disturbed site areas and drainage pathways. Indicate site areas that are expected to undergo initial disturbance or significant site work within the next 14-day period;

(2) Indicate on a site map all areas of the site that have undergone temporary or permanent stabilization;

(3) Indicate all disturbed site areas that have not undergone active site work during the previous 14-day period;

Inspect all sediment control practices and record the approximate degree of sediment accumulation as a percentage of sediment storage volume (for example, 10 percent, 20 percent, 50 percent);

(5) Inspect all erosion and sediment control practices and record all maintenance requirements such as verifying the integrity of barrier or diversion systems (earthen berms or silt fencing) and containment systems (sediment basins and sediment traps). Identify any evidence of rill or gully erosion occurring on slopes and any loss of stabilizing vegetation or seeding/mulching. Document any excessive deposition of sediment or ponding water along barrier or diversion systems. Record the depth of sediment within containment structures, any erosion near outlet and overflow structures, and verify the ability of rock filters around perforated riser pipes to pass water; and

(6) Immediately report to the Operator any deficiencies that are identified with the implementation of the SWPPP.

SITE PLAN/SKETCH

______________________________ ______________________________
Inspector (print name) **Date of Inspection**

______________________________ ______________________________
Qualified Professional (print name) **Qualified Professional Signature**

The above signed acknowledges that, to the best of his/her knowledge, all information provided on the forms is accurate and complete.

Maintaining Water Quality

Yes No NA

[ ] [ ] [ ] Is there an increase in turbidity causing a substantial visible contrast to natural conditions?

[ ] [ ] [ ] Is there residue from oil and floating substances, visible oil film, or globules or grease?

[ ] [ ] [ ] All disturbance is within the limits of the approved plans.

[ ] [ ] [ ] Have receiving lake/bay, stream, and/or wetland been impacted by silt from project?

Housekeeping

1. General Site Conditions

Yes No NA

[ ] [ ] [ ] Is construction site litter and debris appropriately managed?

[ ] [ ] [ ] Are facilities and equipment necessary for implementation of erosion and sediment control in working order and/or properly maintained?

[ ] [ ] [ ] Is construction impacting the adjacent property?

[ ] [ ] [ ] Is dust adequately controlled?

2. Temporary Stream Crossing

Yes No NA

[ ] [ ] [ ] Maximum diameter pipes necessary to span creek without dredging are installed.

[ ] [ ] [ ] Installed non-woven geotextile fabric beneath approaches.

[ ] [ ] [ ] Is fill composed of aggregate (no earth or soil)?

[ ] [ ] [ ] Rock on approaches is clean enough to remove mud from vehicles & prevent sediment from entering stream during high flow.

Runoff Control Practices

1. Excavation Dewatering

Yes No NA

[ ] [ ] [ ] Upstream and downstream berms (sandbags, inflatable dams, etc.) are installed per plan.

[ ] [ ] [ ] Clean water from upstream pool is being pumped to the downstream pool.

[ ] [ ] [ ] Sediment laden water from work area is being discharged to a silt-trapping device.

[ ] [ ] [ ] Constructed upstream berm with one-foot minimum freeboard.

2. Level Spreader

Yes No NA

[ ] [ ] [ ] Installed per plan.

[ ] [ ] [ ] Constructed on undisturbed soil, not on fill, receiving only clear, non-sediment laden flow.

[ ] [ ] [ ] Flow sheets out of level spreader without erosion on downstream edge.

3. Interceptor Dikes and Swales

Yes No NA

[ ] [ ] [ ] Installed per plan with minimum side slopes 2H:1V or flatter.

[ ] [ ] [ ] Stabilized by geotextile fabric, seed, or mulch with no erosion occurring.

[ ] [ ] [ ] Sediment-laden runoff directed to sediment trapping structure

Runoff Control Practices (continued)

4. Stone Check Dam

Yes No NA

[ ] [ ] [ ] Is channel stable? (flow is not eroding soil underneath or around the structure).
[ ] [ ] [ ] Check is in good condition (rocks in place and no permanent pools behind the structure).
[ ] [ ] [ ] Has accumulated sediment been removed?.

5. Rock Outlet Protection

Yes No NA

[ ] [ ] [ ] Installed per plan.
[ ] [ ] [ ] Installed concurrently with pipe installation.

Soil Stabilization

1. Topsoil and Spoil Stockpiles

Yes No NA

[ ] [ ] [ ] Stockpiles are stabilized with vegetation and/or mulch.
[ ] [ ] [ ] Sediment control is installed at the toe of the slope.

2. Revegetation

Yes No NA

[ ] [ ] [ ] Temporary seedings and mulch have been applied to idle areas.
[ ] [ ] [ ] 4 inches minimum of topsoil has been applied under permanent seedings

Sediment Control

1. Stabilized Construction Entrance

Yes No NA

[ ] [ ] [ ] Stone is clean enough to effectively remove mud from vehicles.
[ ] [ ] [ ] Installed per standards and specifications?
[ ] [ ] [ ] Does all traffic use the stabilized entrance to enter and leave site?
[ ] [ ] [ ] Is adequate drainage provided to prevent ponding at entrance?

2. Silt Fence

Yes No NA

[ ] [ ] [ ] Installed on Contour, 10 feet from toe of slope (not across conveyance channels).
[ ] [ ] [ ] Joints constructed by wrapping the two ends together for continuous support.
[ ] [ ] [ ] Fabric buried 6 inches minimum.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.

Sediment accumulation is ___% of design capacity.

Sediment Control (continued)

3. Storm Drain Inlet Protection (Use for Stone & Block; Filter Fabric; Curb; or, Excavated practices)

Yes No NA

[ ] [ ] [ ] Installed concrete blocks lengthwise so open ends face outward, not upward.
[ ] [ ] [ ] Placed wire screen between No. 3 crushed stone and concrete blocks.
[ ] [ ] [ ] Drainage area is 1acre or less.
[ ] [ ] [ ] Excavated area is 900 cubic feet.
[ ] [ ] [ ] Excavated side slopes should be 2:1.
[ ] [ ] [ ] 2" x 4" frame is constructed and structurally sound.
[ ] [ ] [ ] Posts 3-foot maximum spacing between posts.
[ ] [ ] [ ] Fabric is embedded 1 to 1.5 feet below ground and secured to frame/posts with staples at max 8-inch spacing.
[ ] [ ] [ ] Posts are stable, fabric is tight and without rips or frayed areas.

Sediment accumulation ___% of design capacity.

4. Temporary Sediment Trap

Yes No NA

[ ] [ ] [ ] Outlet structure is constructed per the approved plan or drawing.
[ ] [ ] [ ] Geotextile fabric has been placed beneath rock fill.

Sediment accumulation is ___% of design capacity.

5. Temporary Sediment Basin

Yes No NA

[ ] [ ] [ ] Basin and outlet structure constructed per the approved plan.
[ ] [ ] [ ] Basin side slopes are stabilized with seed/mulch.
[ ] [ ] [ ] Drainage structure flushed and basin surface restored upon removal of sediment basin facility.

Sediment accumulation is ___% of design capacity.

Note: Not all erosion and sediment control practices are included in this listing. Add additional pages to this list as required by site specific design.
Construction inspection checklists for post-development stormwater management practices can be found in Appendix F of the New York Stormwater Management Design Manual.

CONSTRUCTION DURATION INSPECTIONS
b. Modifications to the SWPPP (To be completed as described below)

The Operator shall amend the SWPPP whenever:
1. There is a significant change in design, construction, operation, or maintenance which may have a significant effect on the potential for the discharge of pollutants to the waters of the United States and which has not otherwise been addressed in the SWPPP; or
2. The SWPPP proves to be ineffective in:
a. Eliminating or significantly minimizing pollutants from sources identified in the SWPPP and as required by this permit; or
b. Achieving the general objectives of controlling pollutants in stormwater discharges from permitted construction activity; and
3. Additionally, the SWPPP shall be amended to identify any new contractor or subcontractor that will implement any measure of the SWPPP.

Modification & Reason:

III. Monthly Summary of Site Inspection Activities

Name of Permitted Facility:	Today's Date:	Reporting Month:
Location:	Permit Identification #:	
Name and Telephone Number of Site Inspector:		

Date of Inspection	Regular / Rainfall based Inspection	Name of Inspector	Items of Concern

Owner/Operator Certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that false statements made herein are punishable as a class A misdemeanor pursuant to Section 210.45 of the Penal Law."

Signature of Permittee or Duly Authorized Representative

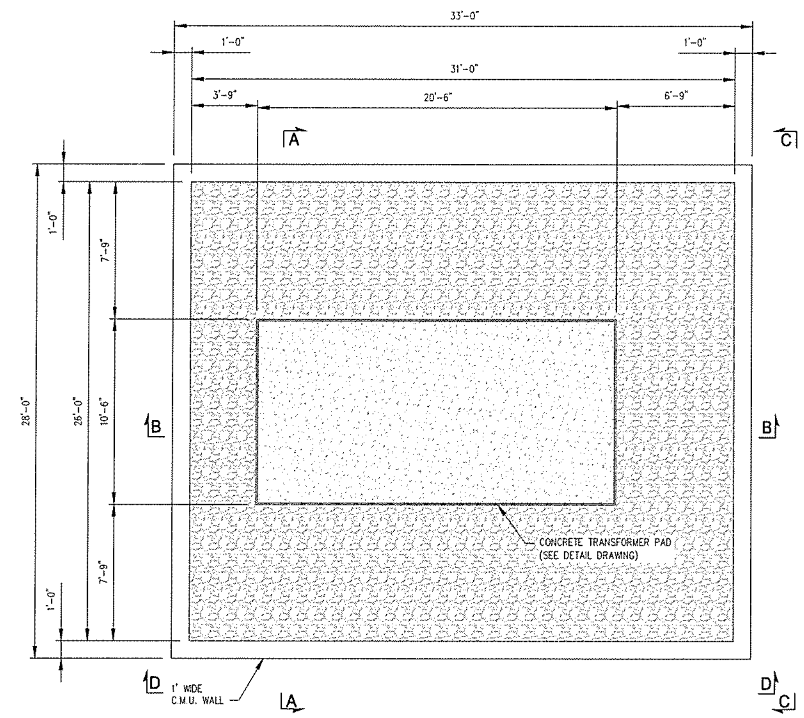
Name of Permittee or Duly Authorized Representative date

Duly authorized representatives <u>must</u> have written authorization, submitted to DEC, to sign any permit documents.

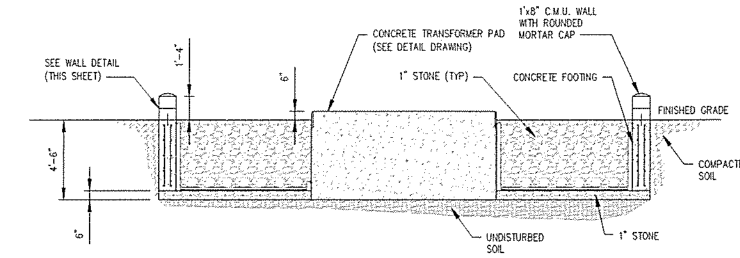
APPENDIX L
Draft Spill Prevention, Control, and Countermeasure Plan

APPENDIX L1

SorbWeb Polymer Product Details



PLAN
SCALE: 1/4" = 1'-0"



SECTION A-A
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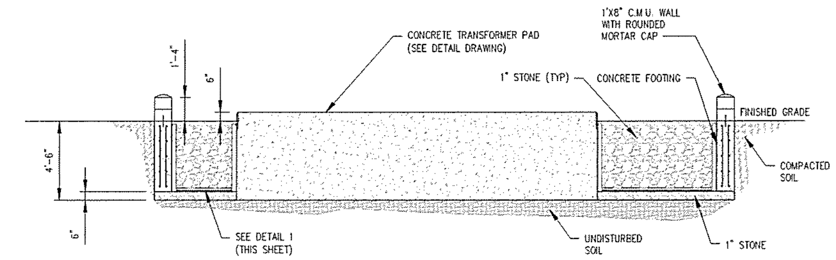
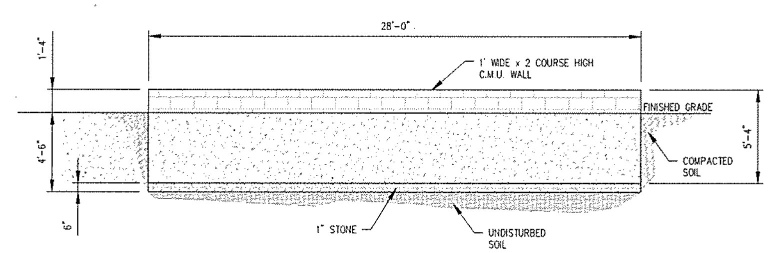
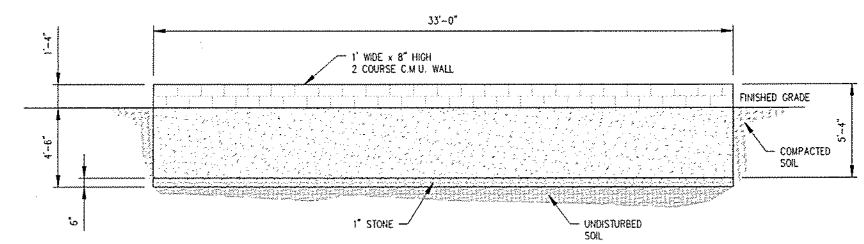


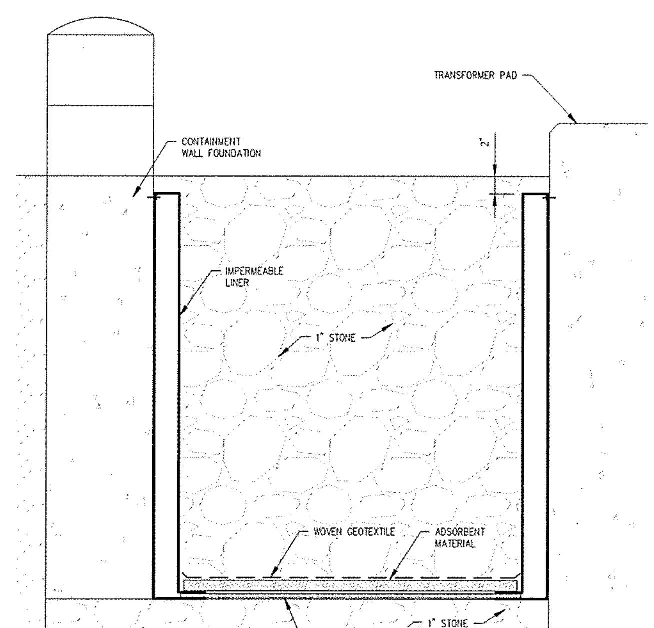
SECTION B-B
SCALE: 1/4" = 1'-0"



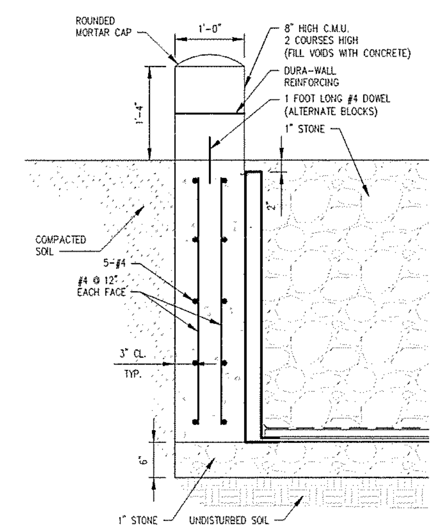
SECTION C-C
SCALE: 1/4" = 1'-0"



SECTION D-D
SCALE: 1/4" = 1'-0"



DETAIL 1
NOT TO SCALE



WALL DETAIL
NOT TO SCALE

ARCH 0 1 2 3
ENGRG 0 1 2 3

REV	REVISION	DWN	DES	CHKD	DATE

ORANGE AND ROCKLAND UTILITIES, INC.
PEARL RIVER NEW YORK

ENGINEERING REVIEW		
DEPT	SIGNATURE	DATE
CIVIL/SURVEY		
TELECOM/MET.		
TRANS & SUB.		
RELAY		

APPROVED

DATE

☐ PERMIT
☐ BID
☐ CONSTRUCTION
☐ RECORD
☐

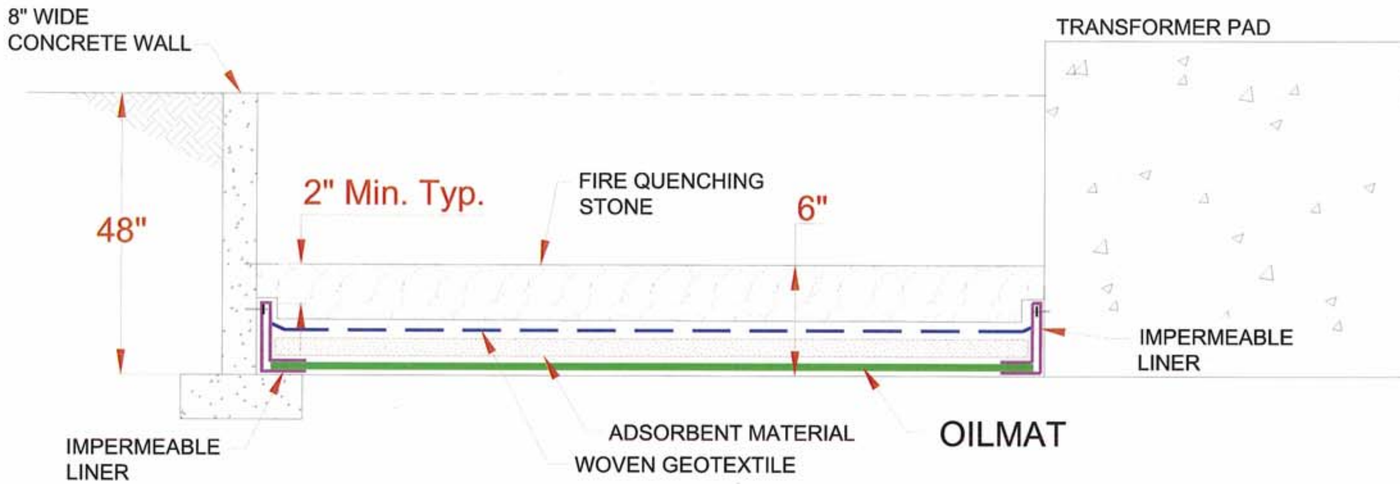
HARTLEY ROAD SUBSTATION

TRANSFORMER CONTAINMENT WALL
PLAN & SECTIONS

DWN J.M.	DES	CHKD
DESIGN REVIEW		DATE

SCALE	STATION NO.	DRAWING NUMBER			SHEET	REV
AS NOTED	0013	K	F	6501	1 OF 1	A

APPENDIX B: DESIGN DETAIL



COMPOSITE VIEW

LEGEND

NOTES

1. ALL DIMENSIONS ARE IN IMPERIAL UNLESS OTHERWISE STATED.
2. FIRE QUENCHING STONE TO BE A WASHED CRUSH WITH NO STONE SMALLER THAN $\frac{3}{4}$" AND NONE LARGER THAN 1" WITH A MINIMUM LIQUID VOID RATIO OF 45%.
3. CONTAINMENT BOUNDARY TO BE AN 8" WIDE CONCRETE WALL.
4. DESIGN IS BASED ON INFORMATION RECEIVED ONLY.

DRAWN BY: M.J.D.	CHECKED BY: Y.J.	APPROVED BY: S. L.

Albarrie

DESCRIPTION:
SORBWEB™ PLUS CONTAINMENT PROFILE

PROJECT:
HARTLEY ROAD SUBSTATION

CLIENT: ORANGE and ROCKLAND UTILITIES INC. or DESIGNATE

DATES: February 14th, 2011 | SCALE: NOT TO SCALE

DRAWING #: AB11027B | REVISION #:

Groove:\Projects\Quotes\Orange and Rockland\Hartley Substation.dwg

Material Safety Data Sheet
Albarrie Canada Ltd.
85 Morrow Road
Barrie, Ontario
L4N 3V7
Tel: 705 737-0551

MATERIAL SAFETY DATA SHEET

Section 1. Material/Company Identification

PRODUCT NAME
Co-Polymer

(Note: This MSDS covers all alphanumeric suffixes for the following products. Suffixes designate location of manufacture, lube type, product form and/or new commercial grade):

CHEMICAL FAMILY

Styrene-Ethylene/Butylene-Styrene Polymer

PRODUCT FAMILY

Thermoplastic Elastomer

Section 2. Composition

COMPONENTS

ALL THE COMPONENTS ARE NON-HAZARDOUS.

Section 3. Hazards Identification

Human Health Hazards
None

Safety Hazards
Electrostatic charges may be generated during handling. Risk of self-ignition of bulk product above certain temperatures (Refer to Section 10). Specifically for powder grades and accumulated polymer dust: dust explosion could occur.

Environmental Hazards
None

Other Hazards
Not classified as hazardous.

Special Notes
These components are synthetic rubber compounds, which are essentially non-toxic. Material is non-irritating. If polymer dusts are generated, they could scratch the eyes and cause minor irritation to the respiratory tract.

Section 4. First Aid Measures

Symptoms and Effects

None

Inhalation
If dust is inhaled, obtain medical attention.

Skin
Flush skin with water.

Eye
Flush eye with water.

Ingestion
None

Advice to Physicians
Treat symptoms.

Section 5. Fire Fighting Measures

Specific Hazards
Not flammable but will burn. Combustion products may include carbon monoxide and carbon dioxide.

Extinguishing Media
Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

Unsuitable Extinguishing Media
Water in a spray may disperse fire.

Protective Equipment
Full protective clothing and self contained breathing apparatus.

Section 6. Accidental Release Measures

Personal Precautions
Avoid generating dust.

Environmental Precautions
None

Clean-up Methods – Small Spillage
Shovel up and place in a labeled, sealable container for product recovery or disposal as required by local, state, federal, international or country specific regulations.

Clean-up Methods – Large Spillage
Transfer to a labeled, sealable container for product recovery or disposal as required by local, state, federal, international or country specific regulations.

Protective Measures
Wear appropriate personal protective equipment (refer to Section 8) when responding to spills.

Spill Management
Shovel and sweep up or use industrial vacuum cleaner. Proper disposal should be evaluated based on the regulatory status of this material (refer to Section 13). Prevent entry into waterways, sewer, or confined areas.

Section 7. Handling and Storage

Handling
Avoid generation of dust. Take precautionary measures against static discharges, earth/ground all equipment. Do not breathe dust. Use local exhaust over processing area.

When processing Albarrie products, maintain a fire watch if the material reaches 225 deg. C (437 deg. F) and 280 deg. C (536 deg. F). The temperatures listed are indicated only for safety reasons (risk of fire and product degradation) and are not recommended for processing.

Degradation of the polymer (polymer breakdown) will start at lower temperatures depending on the specific processing conditions. Therefore, operating below these temperatures does not guarantee the absence of product degradation.

For more information about processing precautions, consult the Albarrie product data documents or other technical literature available from your sales representative.

Static charge buildup can be a potential fire hazard when used in the presence of volatile, flammable vapors or in high airborne dust concentrations. For more information, from you sales representative.

Storage
Keep container dry. Keep in a cool, well-ventilated place. Keep away from direct sunlight and other sources of heat or ignition. Avoid storage of bulk product at temperatures above ambient to minimize risk of exothermic degradation, self-heating and possible self-ignition (Refer to Section 10). Avoid storage under pressure or at elevated temperatures to minimize particulate clustering. Do not stack Flexible Intermediate Bulk Containers (FIBCs) or palletized bags.

Storage Temperatures
Ambient

Product Transfer
Take precautionary measures against static discharge. Earth/Ground all equipment.

Other Information
Albarrie ?) have a tendency to accumulate static charge during transport, handling and processing. Reducing the velocity of material transfer will reduce the likeliness that a charge will be created. Static charge buildup can be a potential fire hazard when used in the presence of volatile, flammable vapors or in high airborne dust concentrations. For more information, consult Albarrie available from your sales representative.

Section 8. Exposure Controls/Personal Protection

Occupational Exposure
None established for components. In the absence of occupational exposure for this product, it is recommended that the following be adopted:

Nuisance Dust TLV
TWA (8h) 10 mg/m^3

Engineering Control Measures
Use local exhaust ventilation.

Respiratory Protection
Where local exhaust ventilation is not practicable and odors are detected use a negative pressure half face respirator equipped with a cartridge designed to protect against organic vapors and if dust is also present a particulate pre-filter should also be used. For high airborne dust concentrations use a cartridge designed to be used against nuisance dust.

Hand Protection
Cloth gloves if desired.

Eye Protection
Dust-tight mono goggles.

Body Protection
Standard issue work clothes which may include: apron, safety shoes or boots as necessary.

Section 9. Physical and Chemical Properties

Physical State: Solid
Color: Clear or White
Odor: Essentially odorless
Flash Point: None
Density: Typical between 880-95 kg/m³ at 20 Deg. C
Specific Gravity: <1
Bulk density (for solids): Typical 300-400 kg/m³ at 20 Deg. C
Solubility (in Water): Insoluble
N-octanol/water partition coefficient (log Pow): Not applicable

Section 10 Reactivity and Stability

Stability
Stable under ambient conditions. Oxidizes exothermically above ambient temperature.

Conditions to Avoid
Avoid contact with strong oxidizing agents. Accumulation of product in areas exposed to elevated temperatures for extended periods in air may result in self-heating and auto ignition. Avoid elevated temperatures in storage for prolonged periods of time.

Hazardous Decomposition Products
Hazardous vapors from heated product are not expected to be generated under normal processing temperatures and conditions.

Although highly dependent on temperature and environmental conditions, a variety of thermal decomposition products may be present if the product is over heated, is smoldering or catches fire. These range from hydrocarbons (such as methane and propane) to toxic/irritating vapors (such as carbon monoxide and dioxide, acrolein, aldehydes and ketones). (Refer to Handling in Section 7).

Section 11. Toxicological Information

Basis for Assessment
Toxicological data has not been determined for this product. Information is based on a knowledge of the toxicology of similar products.

Acute Toxicity Oral
Expected to be of low toxicity, LD50>2000 mg/kg.

Acute Toxicity Dermal
Expected to be of low toxicity, LD50 > 2000 mg/kg.

Acute Toxicity Inhalation
No data available.

Skin Irritation
Not expected to be irritating.

Eye Irritation
Not expected to be irritating.

Skin Sensitization
Not expected to be a skin sensitizer.

Repeated Dose Toxicity
Repeated exposure does not cause toxic effects.

Mutagenicity
Not expected to be a mutagenic hazard.

This product does not contain any carcinogens as listed by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP) or the American Conference of Governmental Industrial Hygienists (ACGIH).

Section 12. Ecological Information

Basis for assessment
Ecotoxicological data has not been determined for this product. The information below is based on a knowledge of the components and the ecotoxicology of similar products.

Mobility
Floats on water. Remains of surface of soil.

Persistence/Degradability
Not expected to be inherently biodegradable. Persists under anaerobic conditions.

Bioaccumulation
Not expected to bioaccumulate.

Acute Toxicity – Fish
Expected to be practically non toxic, LC/EC/IC 50>1000 mg/l

Acute Toxicity – Invertebrates
Expected to be practically non toxic. LC/EC/IC 50>1000 mg/l

Acute Toxicity – Algae
Expected to be practically non toxic, LC/EC/IC 50>1000 mg/l

Acute Toxicity – Bacteria
Expected to be practically non toxic, LC/EC/IC 50>1000 mg/l

Sewage Treatment
Expected to be practically non toxic, LC/EC/IC 50>1000 mg/l

Other Information
[the neat resin or the base product) are high molecular weight polymers which are non-toxic and biologically inactive.

Section 13. Disposal Considerations

Waste Disposal
Recover or recycle if possible, otherwise; incinerate or use a licensed landfill.

Product Disposal
Same as for waste disposal.

Container Disposal
Remove all packaging for recover or waste disposal.

Local Legislation
The recommendations are appropriate for safe disposal. However, local, state, federal, international or country specific regulations should be considered. They may vary, and may be more stringent but must be complied with.

If this material becomes a waste and has not been chemically altered it is not consider a hazardous waste as defined by RCRA (40CFR 261).

Section 14. Transport Information

US Department of Transportation Classification
This material is not classified as hazardous under 49 CFR Parts 171-180.

International Air Transportation Association Classification (IATA)
This material is not classified as hazardous.

International Maritime Organization (IMDG)
This material is not classified as hazardous.

UN, IMO, ADR/RID, ICAO Code
This material is not dangerous for conveyance under these codes.

Section 15. Regulatory Information

This regulatory information is not comprehensive. Other local, state, federal, international or country specific regulations may apply.

INTERNATIONAL LEGISLATION

CANADA – Workplace Hazardous Materials Information System (WHMIS):
"This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required." This is NOT a WHMIS controlled product.

EUROPE – EC Classification
Not classified as dangerous.

UNITED STATES REGULATIONS:

US Federal - **Superfund Amendment & Reauthorization Act (SARA) Title ❋❋❋**
Not regulated.
US Federal - **Toxic Substances Control Act (TSCA) Inventory Status**
All components are listed.
US State - **California Safe Drinking Water Act**
Not regulated.
US State - **Toxic Environment Act (Proposition 65)**
Not regulated.
US State - **New Jersey Right-To-Know List**
Not regulated.
US State - **Pennsylvania Right-To-Know List**
Not regulated.

Section 16. Other Information

Revision #: **19**
Revision date: **June 27, 2007**
Revisions since last change (discussion): **Added a new product name to Section 1.**

Medical, Healthcare and Cosmetic Applications and Trademark Usage
Albarrie's products should not be used in any devices or materials intended for implantation in the human body as defined by the U.S. Food and Drug Administration under 21 CFR 812.3(d) and 21 CFR 860.3(d). Albarrie products, may in certain circumstances, be used in the following products or applications with prior written approval for each specific product or application: a. Cosmetics (exclusive of packaging or delivery applications). b. Drugs and other Pharmaceuticals (exclusive of packaging or delivery applications). Albarrie trade name, trademarks, logos or other similar identifying characteristics should not be used in the manufacture, sale, or promotion of cosmetics, drugs, and pharmaceutical products or other medical/healthcare applications or materials. Albarrie has not specific expertise in these markets and applications, and does not intend to perform testing, clinical studies or other investigations of the suitability of its products for specific applications. Each customer or use of Albarrie products is solely responsible for determining the suitability of the materials it selects for the intended purpose and acknowledges that is has not relied on any representations of Albarrie products regarding suitability for use in its intended cosmetics, drugs, pharmaceutical products or materials.

Please contact your Albarrie Sales Representative for more details before using our products in these specific applications.

Information on the food packaging clearances of individual products is available from Albarrie at ???????

Other Information

Disclaimer
The information in this document is based on our current knowledge and is intended to describe the product for the purpose of Health, Safety and Environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product. Advice in this document relates only to the product as originally supplied. Where other ingredients are added in the processing of this product, advice should be sought on their safe handling and use.

Albarrie GeoComposites Ltd.,
www.sorbwebplus.com
T: 705-737-0551
Toll free: 1-866-269-8275

SorbWeb Plus Secondary Oil Spill Containment System

References

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519-361-2673 x 4126
Jim.hanna@brucepower.com

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Ken.kadis@atcoutilityservices.com

ERCO WorldWide, Toronto, Ontario
F. Kirk Winsor
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larryh@vectorgroup.com

Testing of an Engineered Geosynthetic Secondary Oil Containment System in Holding Hydro Carbons.

Scott Lucas
Albarrie Canada Limited

ABSTRACT: This paper presents the technique employed to test the Sorbweb™Plus secondary oil containment system in the containment of hydro carbons. This paper will explain the testing method employed for the testing of the engineered system and the results obtained from three testing laboratories.

1. Introduction

Sorbweb™Plus is an engineered patented secondary oil containment system which uses various geosynthetics for the containment of hydro carbons. Sorbweb™Plus primary use has been in the containment of oil from oil filled electrical equipment should there be a failure, however Sorbweb™Plus can be employed for secondary containment of many hydro carbon applications.

Sorbweb™Plus is an engineered system which is designed without requiring electrical components or any type of pumps. It is designed to allow water from rainfall and/or melted snow to drain through the containment area into the sub-grade without accumulating. The hydraulic conductivity of the Sorbweb™Plus system is typically greater than the sub-soil. Where sub-soils are effectively impermeable, drainage systems are built underneath the system to move the water away from the containment area.

However, in the event of failure from hydro carbon filled equipment the system will effectively seal and contain all hydro carbons.

In as much as the system is devised of a number of critical components it is necessary to incorporate a test method which would use all the components of the Sorbweb™Plus system. The test method employed would be repeatable by any testing party and be able to obtain reproducible results.

Such a test method was established, "Test Method for Leaching Oil in a Column Apparatus". The test method has been designated as document TWI-DEP-003.

From this test method, leachate from the built Sorbweb™Plus system in the test has been collected and the leachate was tested in accordance to ASTM D1664A and USEPA 1664A to determine whether hydro carbons were fully contained within the system. The EPA approved this method for use under the Clean Water ACT as an additional analytical method for the determination of oil and grease and non-polar material in aqueous matrices.

2. Test Method TWI-DEP-003

1.0 Scope:

Leaching of Oil and flow rates through SorbWeb™ Plus are to be assessed when required with the use of the following Technical Work Instruction. Albarries' SorbWeb™ Plus solution is an effective and reliable passive system that provides continuous protection against oil spills from transformers. It is a "smart" system that allows water from rainfall and/or melted snow to drain through the containment area without accumulating, while retaining any oil that might leak or spill from the transformer.

Flow rates are assessed to measure the permeability of the passive layer. Water is run through the system prior to oil release in order to saturate the material. Immediately after the addition of water, the oil is then released and an impermeable layer is formed. The SorbWeb™ Plus material forms a seal and the water is tested to ensure that there is no passage of oil through the SorbWeb™ Plus. Oil and water are tested using analytical methods for Extractable Hydrocarbon C10-25 and C24-50.

2.0 Personnel Qualifications/Experience: Civil Engineering Technologist or a qualified Lab Technician.

3.0 Apparatus/Equipment/Materials:

- 14 cm circle of oil mat or other oil absorbing material being tested
- 155 cm tall, 15.5 cm outer diameter and 14.5 cm inner diameter clear polypropylene column/cylinder open at both ends
- Caulking
- Metal large opening support mesh
- 3 plastic support discs
- 14.5 cm (in diameter), 5.0 cm high disc of non compressed adsorbent layer.
- Two 14.5 cm (in diameter) discs of woven geotextile.

Prepared by:	Approved by:
Name: Title: MAURICE QUESNELLE	Name: Title: CIVIL ENGINEERING TECHNOLOGIST
Date: JULY 28/09	Date:

- 1L pyrex beaker
- Tap Water from hose.
- Medium coarse sand measuring 5 cm in height when added to the column.
- Fire quenching stones measuring 60 cm in height when added to the column.
- 500 ml Mineral oil
- Bottles for sample collection provided by accredited lab
- Clean (oil-free) 10L pail for containment
- Timer (seconds)
- Rubber gasket
- Two 13 cm high cylinder attachments
- Stand to support column
- Teflon cone

4.0 Calibration/Check Standards:

- All samples to be tested by an accredited lab.

5.0 Required Standards, Codes & Specifications: (standards required to do the work i.e. ASTM, IEEE, CSA, etc.)

6.0 Test Method:

- Cut out a 14cm circle of SorbWeb™ Plus or other oil absorbent material being tested.
- Carefully apply caulking in 14 cm circle at the bottom of one of the 13 cm column / cylinder.
- Insert the test sample into the column / cylinder and apply additional caulking at the top and bottom of the test sample where it makes contact to the walls of the cylinder to ensure a good seal.
- Allow to dry for 24 hours.
- Making sure that the seal in complete around the edges, insert 3 plastic support discs in the metal section of the cylinder, followed by the metal screen.

- Bolt together with the second 13 cm cylinder using nut and bolt assemblies provided with the apparatus.
- Place a 14.5 cm disc of adsorbent material on top of the oilmat (in the clear portion of the cylinder.
- Place a 14.5 cm disc of woven geotextile above the adsorbent material.
- Place 5 cm of sand above the first woven geotextile disc.
- Place a 14.5 cm disc of woven geotextile above the sand layer.
- Place a rubber gasket around the upper plate and bolt together with large cylinder.
- Add 60 cm of fire quenching stone into the cylinder.
- Mount the completed assembly onto the stand and place pail below cylinder.
- Mount the Teflon cone to the bottom of the apparatus to facilitate sample collection.
- Saturate test material with steady flow of water for approximately 10 minutes.
- If a flow rate test is required, complete the following seven steps.
- Once material is saturated, adjust flow to a steady head of 10 cm above the test material
- Ensure that head is maintained with a constant flow for at least 5 minutes
- Once the head is maintained at a steady level, remove the hose and fill the 4L container at a constant flow for 60 seconds using a timing device
- Measure water to determine flow rate (L/min)
- Repeat flow measurements for a steady head of 15cm, 20 cm, 30 cm, 35 cm, 40 cm, 45 cm and 50 cm.
- Measure flow ensuring that a steady level is maintained for each of the above levels for 60 seconds
- Determine flow rates for each of the above levels
- Once all the flow measurements are completed, allow the apparatus to drain.
- Measure out the required volume of water to fill the appropriate sample bottles provided (depending on required test)
- Pour water into apparatus and collect samples using the Teflon cone.
- Pour the same quantity of water for the second part of the test followed by 500 mL of mineral oil.
- Place test bottles directly under cone to collect second set of samples.
- Allow oil to sit for at least 15 minutes
- Identify all samples, and refrigerate immediately.
- Submit for oil analysis

- Containers shall be amber glass with Teflon-lined caps
- Analysis shall be conducted for: extractable hydrocarbons C10-25 (in water and extractable hydrocarbons C24-50 (in water)
- Observe oil absorbent material and determine whether the material has been sealed
- Remove SorbWeb^{TM} Plus circle and place in labeled sample bag for further analysis.

7.0 Quality Control:

- Submit apparatus water sample for analysis.
- Submit for oil analysis
- Containers shall be amber glass with Teflon-lined caps
- Analysis shall be conducted for: extractable hydrocarbons C10-25 (in water and extractable hydrocarbons C24-50 (in water)

8.0 Records/reports: (output forms/lists - approval, distribution and storage)

8.0 Optional Requirements:

Standard safety equipment (lab coat, safety glasses, gloves etc.) should be worn when handling samples.

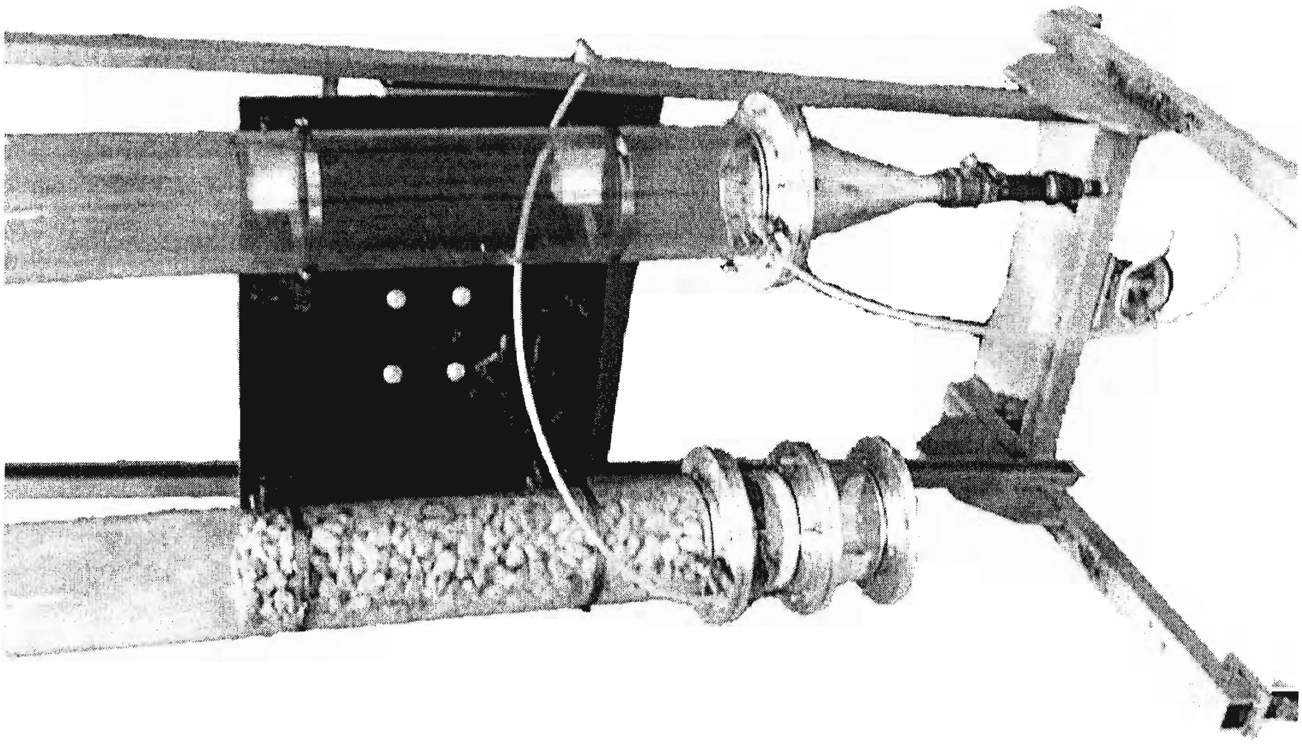
9.0 Bibliographic Information:

Sato J., Oct. 21, 2001. Sorweb TM Con-Sep, Evaluation of the Use of "Imbiber Beads" to Improve Containment Time. Procedure to Carry-Out an Oil "Leaching Test".

Notes:

Revision Abstract

Rev No	Section	Description	Prepared By	Approved By	Issue Date
2		Modified Kinectric's instructions to reflect Albarrie's method.	M.G.Q.		



TESTING APPARATUS
IN ACCORDANCE TO TWI-DEP-003

3. Testing results

Following are results obtained from three different test results following the stated test procedure and having the leachate tested in accordance to ASTM D1664A and USEPA 1664A.

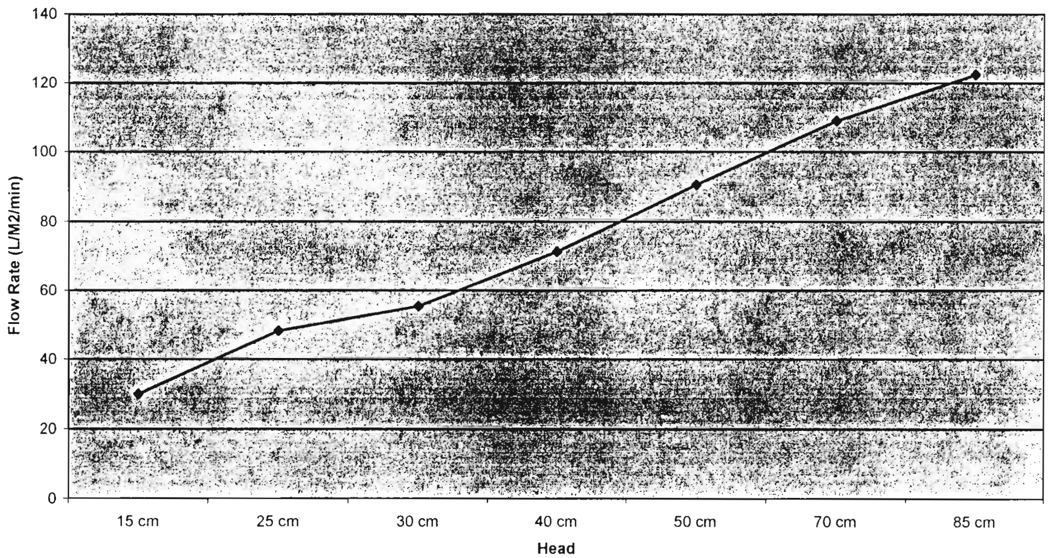
3.1 Kinectrics laboratory

Leaching of Mineral Oil in a Column Apparatus using Sorbweb™Plus .

A Column apparatus was initially setup using a 100 cm column.
A disc of oil mat was cut out and placed at the bottom of the column apparatus. It was sealed using Sikaflex 1a. The diameter of the disc (minus caulking) was 13.5 cm.
Total area of the oil mat was 69.86 cm^2.
5 cm of Roxul was placed above the oil mat layer.
A disc of woven was placed above the Roxul layer.
2.5 cm of coarse sand was poured above the woven.
Another layer of woven was placed above the sand.
The last layer was 90cm of crushed gravel/rock of 19 to 38 mm in diameter with the average size of 25mm.
Flow rates were initially determined using the method stated in NPDV-SW-PSWI-0003.
See results for flow rates below:

We measured 7 different heads above the SorbWeb® mat.	L/min	**Liters per M2 per min**
15 cm head: 428.13 ml per minute or 25.6878 L per hour	0.42813	**29.91013**
25 cm head: 690.7 ml per minute or 41.442 L per hour	0.6907	**48.25386**
30 cm head: 793.70 ml per minute or 47.622 L per hour	0.7937	**55.44967**
40 cm head: 1018.99 ml per minute or 61.1394 L per hour	1.01899	**71.18894**
50 cm head: 1294.72 ml per minute or 77.6832 L per hour	1.29472	**90.45206**
70 cm head: 1559.18 ml per minute or 93.5508 L per hour	1.55918	**108.9278**
85 cm head: 1,752.02 ml per minute or 105.1212 L per hour	1.75202	**122.4001**

Flow Rates for Sorbweb Setup
(Sorbweb/Roxul/mirafi/sand/mirafi/90 cm of gravel)
(L/M2/min)



The second step of the experiment was the Leaching of Mineral Oil in the column apparatus. The method used for the leaching test is stated in NPDV-SW-PSWI-0004. (Please see attached).
The column apparatus was placed in a clean bucket.
A slow stream of water was run through the column.
A sample was decanted and submitted for analysis. This served as a control sample to ensure that there was no oil in the system prior to conducting the leaching experiment.
The column was set back onto a clean bucket.
As the water was running, 1000 mL of Mineral Oil was slowly poured into the column. This took approximately 10 minutes.
The running water was shut off. The column was let to sit for 60 minutes to allow for the oil to settle and the oil mat and Roxul layer to absorb the Mineral oil.
A sample was collected and submitted for Oil and Grease analysis.
The results for the experiment are stated below:

Sample Number: 1 Sample Name: SORBWEB #1 CONTROL Date Sampled: 1Mar2006 Date Tested: 3Mar2006 in accordance to ASTM D1664A and USEPA 1664A

Analyte	Conc	Units	MDL	Technique
Oil in water by hexane ext [MDL=1.0]	<1.	ppm	1.0	

Sample Number: 2 Sample Name: SORBWEB #2 C1000ML OIL+2LWATER Date Sampled: 1Mar2006 Date Tested: 3Mar2006 in accordance to ASTM D1664A and USEPA 1664A

Analyte	Conc	Units	MDL	Technique
Oil in water by hexane ext [MDL=1.0]	2.4	ppm	1.0	

3.2 Testing by Albarrie Canada Limited

To collaborate the testing from Kinectrics Inc. further testing using the parameters set forth by test method TWI-DEP-003 by Maurice Quesnelle and Michael Dowds, civil technologist with Albarrie.

Testing of the leachate was performed by Maxxam Analytics an independent laboratory located in Mississauga, Ontario. Maxxam is registered under ISO 9002 standard. Maxxam is also accredited by MDDEP, SCC and/or CALA, certified by US Department of Health and Human Services and licensed by the Ontario Ministry of the Environment.

Testing of the leachate was done in accordance to ASTM D1664A and USEPA 1664.

Maxxam supplied the amber glass containers with Teflon lined caps which were used to first obtain a control sample from the water passing the Sorbweb™Plus system and the other container to collect the leachate once the oil was introduced to the test.

Containers were immediately refrigerated once sealed, then packed in cooler of ice provided by Maxxam and couriered to their facilities for testing.

Following are the results which Maxxam achieved through their testing.

Your P.O. #: SORBWCB
Your C.O.C. #: 15789001, 157890-0

Attention: Maurice Quesnelle
Albarrie Canada Ltd
85 Morrow Rd
Barrie, ON
CANADA L4N 3V7

Report Date: 2009/07/27

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A991832
Received: 2009/07/21, 10:25

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydrocarbons F2-F4 in Water	2	2009/07/23	2009/07/24	CAM SOP-00316	CCME Hydrocarbons
Animal and Vegetable Oil & Grease	2	N/A	2009/07/23	CAM SOP-00326	SM 5520 B
Total Oil and Grease	2	2009/07/23	2009/07/23	CAM SOP-00326	EPA 1664A
TPH (Heavy Oil) (1)	2	2009/07/23	2009/07/23	CAM SOP-00326	SM 5520F

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Antonella Bf

Antonella Brasil

27 Jul 2009 14:00:06 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

ANTONELLA BRASIL, Project Manager
Email: Abrasil@maxxamanalytics.com
Phone# (905) 817-5817

==

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CALA have approved this reporting process and electronic report format.

For Service Group specific validation please refer to the Validation Signature Page

Total cover pages: 1

Albarrie Canada Ltd

Maxxam Job #: A991832
Report Date: 2009/07/27

Your P.O. #: SORBWCB

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		DD3800	DD3801		
Sampling Date		2009/07/20 14:20	2009/07/20 15:10		
COC Number		157890-0	157890-0		
	Units	**SAMPLE 1 APPARATUS**	**SAMPLE 2 OIL ADDED**	**RDL**	**QC Batch**

F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/L	ND	ND	100	1887408
F3 (C16-C34 Hydrocarbons)	ug/L	ND	ND	100	1887408
F4 (C34-C50 Hydrocarbons)	ug/L	ND	ND	100	1887408
Reached Baseline at C50	ug/L	Yes	Yes	N/A	1887408
Surrogate Recovery (%)					
o-Terphenyl	%	100	103	N/A	1887408

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Albarrie Canada Ltd
Attention: Maurice Quesnelle
Client Project #:
P.O. #: SORBWCB
Project name:

Quality Assurance Report

Maxxam Job Number: MA991832

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1886572 FA	Spiked Blank	Total Oil & Grease	2009/07/23		98	%	85 - 115
	RPD	Total Oil & Grease	2009/07/23	1.0		%	25
	Method Blank	Total Oil & Grease	2009/07/23	ND, RDL=0.5		mg/L	
1886575 FA	Spiked Blank	Total Oil & Grease Mineral/Synthetic	2009/07/23		97	%	85 - 115
	RPD	Total Oil & Grease Mineral/Synthetic	2009/07/23	1.0		%	25
	Method Blank	Total Oil & Grease Mineral/Synthetic	2009/07/23	ND, RDL=0.5		mg/L	
1887408 RGA	MATRIX SPIKE	o-Terphenyl	2009/07/24		99	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2009/07/24		84	%	60 - 130
		F3 (C16-C34 Hydrocarbons)	2009/07/24		84	%	60 - 130
		F4 (C34-C50 Hydrocarbons)	2009/07/24		84	%	60 - 130
	Spiked Blank	o-Terphenyl	2009/07/24		107	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2009/07/24		91	%	60 - 130
		F3 (C16-C34 Hydrocarbons)	2009/07/24		91	%	60 - 130
		F4 (C34-C50 Hydrocarbons)	2009/07/24		91	%	60 - 130
	Method Blank	o-Terphenyl	2009/07/24		98	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2009/07/24	ND, RDL=100		ug/L	
		F3 (C16-C34 Hydrocarbons)	2009/07/24	ND, RDL=100		ug/L	
		F4 (C34-C50 Hydrocarbons)	2009/07/24	ND, RDL=100		ug/L	
	RPD	F2 (C10-C16 Hydrocarbons)	2009/07/24	NC		%	50
		F3 (C16-C34 Hydrocarbons)	2009/07/24	NC		%	50
		F4 (C34-C50 Hydrocarbons)	2009/07/24	NC		%	50

ND = Not detected
NC = Non-calculable
RPD = Relative Percent Difference
SPIKE = Fortified sample

Validation Signature Page

Maxxam Job #: A991832

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

BRAD NEWMAN, Scientific Specialist

M. Riskallah

MEDHAT RISKALLAH, Manager, Hydrocarbon Department

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CALA have approved this reporting process and electronic report format.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

3.3 Georgian College, Barrie, Ontario campus

A local College in Barrie, Georgian College was approached for a completely independent test using Test Method TWI-DEP-003.

From Georgian College Chris P. Berni, Manager Applied Research in Engineering Technology and Jessie Baxter an undergraduate in Engineering Technology were approached to conduct the testing.

They were instructed on the preparation of the test and how to perform the test. Completely independent of any other personnel they ran the test in accordance to TWI-DEP-003.

As the previous test conducted with Albarrie personnel, Maxxam Analytics were to perform the testing of the leachate.

As with the previous test Maxxam supplied the amber glass containers with Teflon lined caps which were to first obtain a control sample from the water passing the Sorbweb™Plus system and the other container to collect the leachate once the oil was introduced to the test.

Containers were immediately refrigerated once sealed, then packed in a cooler of ice provided by Maxxam and couriered to their facilities for testing in accordance to ASTM D1664A and USEPA 1664A.

Following are the results which Maxxam achieved through their testing.

Your Project #: SORWEB
Your C.O.C. #: 15810901, 158109-0

Attention: Maurice Quesnelle
Albarrie Canada Ltd
85 Morrow Rd
Barrie, ON
CANADA L4N 3V7

Report Date: 2009/07/30

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A994088
Received: 2009/07/24, 10:43

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Animal and Vegetable Oil & Grease	2	N/A	2009/07/29	CAM SOP-00326	SM 5520 B
Total Oil and Grease	2	2009/07/28	2009/07/28	CAM SOP-00326	EPA 1664A
TPH (Heavy Oil) (1)	2	2009/07/28	2009/07/28	CAM SOP-00326	SM 5520F

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Antonella BP

Antonella Brasil

30 Jul 2009 14:59:07 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

ANTONELLA BRASIL, Project Manager
Email: Abrasil@maxxamanalytics.com
Phone# (905) 817-5817

==
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Total cover pages: 1

Maxxam Job #: A994088
Report Date: 2009/07/30

Albarrie Canada Ltd
Client Project #: SORWEB

RESULTS OF ANALYSES OF WATER

Maxxam ID		DE4484	DE4487		
Sampling Date		2009/07/23 11:08	2009/07/23 11:52		
COC Number		158109-0	158109-0		
	Units	**SAMPLE 1 APP 11:08**	**SAMPLE 2 OIL ADDED 11:52**	**RDL**	**QC Batch**

Calculated Parameters					
Total Animal/Vegetable Oil and Grease	mg/L	ND	ND	0.5	1889527
Petroleum Hydrocarbons					
Total Oil & Grease	mg/L	ND	ND	0.5	1890581
Total Oil & Grease Mineral/Synthetic	mg/L	ND	ND	0.5	1890583

ND = Not detected
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: A994088
Report Date: 2009/07/30

Albarrie Canada Ltd
Client Project #: SORWEB

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Albarrie Canada Ltd
Attention: Maurice Quesnelle
Client Project #: SORWEB
P.O. #:
Project name:

Quality Assurance Report

Maxxam Job Number: MA994088

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1890581 FA	Spiked Blank	Total Oil & Grease	2009/07/28		100	%	85 - 115
	RPD	Total Oil & Grease	2009/07/28	1.7		%	25
	Method Blank	Total Oil & Grease	2009/07/28	ND, RDL=0.5		mg/L	
1890583 FA	Spiked Blank	Total Oil & Grease Mineral/Synthetic	2009/07/28		97	%	85 - 115
	RPD	Total Oil & Grease Mineral/Synthetic	2009/07/28	3.2		%	25
	Method Blank	Total Oil & Grease Mineral/Synthetic	2009/07/28	ND, RDL=0.5		mg/L	

ND = Not detected
RPD = Relative Percent Difference
SPIKE = Fortified sample

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

3.4 Alternative test by Albarrie Canada Limited

Testing was performed in accordance to TWI-DEP-003 by Maurice Quesnelle and Michael Dowds, civil technologists with Albarrie.

Protocol was followed in accordance to TWI-DEP-003.

As with other testing, Maxxam Analytics was contracted to perform the analysis on the leachate from the testing.

As with other testing performed through Maxxam, amber glass containers with Teflon lined caps were supplied by Maxxam. A control sample from water passing through the Sorbweb™Plus system was collected and a second container was the leachate after the oil was introduced into the system.

Containers were immediately refrigerated once sealed, then packed in a cooler of ice provided by Maxxam and couriered to their facility for testing. However, testing of the leachate, was performed in accordance with Ontario Ministry of the Environment's established protocol.

Following are the results achieved through this test method.

Your P.O. #: SORBWEB
Your Project #: Hydrocarbons
Your C.O.C. #: 15377001, 153770-0

Attention: Maurice Quesnelle
Albarrie Canada Ltd
85 Morrow Rd
Barrie, ON
CANADA L4N 3V7

Report Date: 2009/07/15

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: A985464
Received: 2009/07/09, 10:34

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Petroleum Hydro. CCME F1 & BTEX in Water	2	N/A	2009/07/14	CAM SOP-00315	CCME CWS
Petroleum Hydrocarbons F2-F4 in Water	2	2009/07/13	2009/07/14	CAM SOP-00316	CCME Hydrocarbons

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Antonella Brasil
Antonella Brasil
15 Jul 2009 12:55:57 -04:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

ANTONELLA BRASIL, Project Manager
Email: Abrasil@maxxamanalytics.com
Phone# (905) 817-5817

==
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. SCC and CALA have approved this reporting process and electronic report format.

For Service Group specific validation please refer to the Validation Signature Page

Total cover pages: 1

Maxxam Job #: A985464
Report Date: 2009/07/15

Albarrie Canada Ltd
Client Project #: Hydrocarbons

Your P.O. #: SORBWEB

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		DA3826		DA3827		
Sampling Date						
COC Number		153770-0		153770-0		
	Units	**APPARATUS**	**QC Batch**	**OIL ADDED**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons						
Benzene	mg/L	ND	1877618	ND	0.0002	1877618
Toluene	mg/L	0.0003	1877618	ND	0.0002	1877618
Ethylbenzene	mg/L	0.13	1877618	0.073	0.0002	1877618
o-Xylene	mg/L	0.083	1877618	0.048	0.0002	1877618
p+m-Xylene	mg/L	0.34	1877618	0.22	0.0004	1877618
Total Xylenes	mg/L	0.42	1877618	0.27	0.0004	1877618
F1 (C6-C10)	mg/L	0.6	1877618	0.4	0.1	1877618
F1 (C6-C10) - BTEX	mg/L	ND	1877618	ND	0.1	1877618
F2-F4 Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	mg/L	ND	1876479	ND	0.1	1876251
F3 (C16-C34 Hydrocarbons)	mg/L	ND	1876479	ND	0.1	1876251
F4 (C34-C50 Hydrocarbons)	mg/L	ND	1876479	ND	0.1	1876251
Reached Baseline at C50	mg/L	Yes	1876479	Yes	N/A	1876251
Surrogate Recovery (%)						
1,4-Difluorobenzene	%	99	1877618	100	N/A	1877618
4-Bromofluorobenzene	%	103	1877618	108	N/A	1877618
D10-Ethylbenzene	%	110	1877618	105	N/A	1877618
D4-1,2-Dichloroethane	%	102	1877618	101	N/A	1877618
o-Terphenyl	%	84	1876479	89	N/A	1876251

ND = Not detected
N/A = Not Applicable
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: A985464
Report Date: 2009/07/15

Albarrie Canada Ltd
Client Project #: Hydrocarbons

Your P.O. #: SORBWEB

GENERAL COMMENTS

Results relate only to the items tested.

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Albarrie Canada Ltd
Attention: Maurice Quesnelle
Client Project #: Hydrocarbons
P.O. #: SORBWEB
Project name:

Quality Assurance Report

Maxxam Job Number: MA985464

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1876251 JJE	MATRIX SPIKE	o-Terphenyl	2009/07/14		91	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2009/07/14		92	%	60 - 130
		F3 (C16-C34 Hydrocarbons)	2009/07/14		92	%	60 - 130
		F4 (C34-C50 Hydrocarbons)	2009/07/14		92	%	60 - 130
	Spiked Blank	o-Terphenyl	2009/07/14		92	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2009/07/14		100	%	60 - 130
		F3 (C16-C34 Hydrocarbons)	2009/07/14		100	%	60 - 130
		F4 (C34-C50 Hydrocarbons)	2009/07/14		100	%	60 - 130
	Method Blank	o-Terphenyl	2009/07/14		91	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2009/07/14	ND, RDL=0.1		mg/L	
		F3 (C16-C34 Hydrocarbons)	2009/07/14	ND, RDL=0.1		mg/L	
		F4 (C34-C50 Hydrocarbons)	2009/07/14	ND, RDL=0.1		mg/L	
	RPD	F2 (C10-C16 Hydrocarbons)	2009/07/14	NC		%	50
		F3 (C16-C34 Hydrocarbons)	2009/07/14	NC		%	50
		F4 (C34-C50 Hydrocarbons)	2009/07/14	NC		%	50
1876479 ZZ	MATRIX SPIKE	o-Terphenyl	2009/07/14		84	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2009/07/14		82	%	60 - 130
		F3 (C16-C34 Hydrocarbons)	2009/07/14		82	%	60 - 130
		F4 (C34-C50 Hydrocarbons)	2009/07/14		82	%	60 - 130
	Spiked Blank	o-Terphenyl	2009/07/14		84	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2009/07/14		82	%	60 - 130
		F3 (C16-C34 Hydrocarbons)	2009/07/14		82	%	60 - 130
		F4 (C34-C50 Hydrocarbons)	2009/07/14		82	%	60 - 130
	Method Blank	o-Terphenyl	2009/07/14		84	%	30 - 130
		F2 (C10-C16 Hydrocarbons)	2009/07/14	ND, RDL=0.1		mg/L	
		F3 (C16-C34 Hydrocarbons)	2009/07/14	ND, RDL=0.1		mg/L	
		F4 (C34-C50 Hydrocarbons)	2009/07/14	ND, RDL=0.1		mg/L	
	RPD	F2 (C10-C16 Hydrocarbons)	2009/07/14	61.6 (1)		%	50
		F3 (C16-C34 Hydrocarbons)	2009/07/14	7.3		%	50
		F4 (C34-C50 Hydrocarbons)	2009/07/14	NC		%	50
1877618 GRU	MATRIX SPIKE	1,4-Difluorobenzene	2009/07/14		94	%	70 - 130
		4-Bromofluorobenzene	2009/07/14		99	%	70 - 130
		D10-Ethylbenzene	2009/07/14		102	%	70 - 130
		D4-1,2-Dichloroethane	2009/07/14		92	%	70 - 130
		Benzene	2009/07/14		96	%	70 - 130
		Toluene	2009/07/14		94	%	70 - 130
		Ethylbenzene	2009/07/14		110	%	70 - 130
		o-Xylene	2009/07/14		114	%	70 - 130
		p+m-Xylene	2009/07/14		113	%	70 - 130
		F1 (C6-C10)	2009/07/14		84	%	70 - 130
	Spiked Blank	1,4-Difluorobenzene	2009/07/14		96	%	70 - 130
		4-Bromofluorobenzene	2009/07/14		108	%	70 - 130
		D10-Ethylbenzene	2009/07/14		100	%	70 - 130
		D4-1,2-Dichloroethane	2009/07/14		97	%	70 - 130
		Benzene	2009/07/14		98	%	70 - 130
		Toluene	2009/07/14		103	%	70 - 130
		Ethylbenzene	2009/07/14		108	%	70 - 130
		o-Xylene	2009/07/14		118	%	70 - 130
		p+m-Xylene	2009/07/14		108	%	70 - 130
		F1 (C6-C10)	2009/07/14		105	%	70 - 130
	Method Blank	1,4-Difluorobenzene	2009/07/14		111	%	70 - 130
		4-Bromofluorobenzene	2009/07/14		109	%	70 - 130
		D10-Ethylbenzene	2009/07/14		115	%	70 - 130
		D4-1,2-Dichloroethane	2009/07/14		107	%	70 - 130
		Benzene	2009/07/14	ND, RDL=0.0002		mg/L	

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Albarrie Canada Ltd
Attention: Maurice Quesnelle
Client Project #: Hydrocarbons
P.O. #: SORBWEB
Project name:

Quality Assurance Report (Continued)

Maxxam Job Number: MA985464

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	Recovery	Units	QC Limits
1877618 GRU	Method Blank	Toluene	2009/07/14	ND, RDL=0.0002		mg/L	
		Ethylbenzene	2009/07/14	ND, RDL=0.0002		mg/L	
		o-Xylene	2009/07/14	ND, RDL=0.0002		mg/L	
		p+m-Xylene	2009/07/14	ND, RDL=0.0004		mg/L	
		Total Xylenes	2009/07/14	ND, RDL=0.0004		mg/L	
		F1 (C6-C10)	2009/07/14	ND, RDL=0.1		mg/L	
		F1 (C6-C10) - BTEX	2009/07/14	ND, RDL=0.1		mg/L	
	RPD	Benzene	2009/07/14	NC		%	40
		Toluene	2009/07/14	NC		%	40
		Ethylbenzene	2009/07/14	NC		%	40
		o-Xylene	2009/07/14	NC		%	40
		p+m-Xylene	2009/07/14	NC		%	40
		Total Xylenes	2009/07/14	NC		%	40
		F1 (C6-C10)	2009/07/14	NC		%	40
		F1 (C6-C10) - BTEX	2009/07/14	NC		%	40

ND = Not detected
NC = Non-calculable
RPD = Relative Percent Difference
SPIKE = Fortified sample
(1) Duplicate results exceeded RPD acceptance criteria for flagged analytes. This is likely due to sample heterogeneity.

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Validation Signature Page

Maxxam Job #: A985464

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

MAMDOUH SALIB, Analyst, Hydrocarbons

SUZANA POPOVIC, Supervisor, Hydrocarbons

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4. Conclusions

Testing run by three different laboratories including independent laboratories and independent testing of the collected leachate from the test method DWI-DEP-003 has shown that the test method is repeatable and results obtained from the running of this test method show results are reproducible.

Testing of the leachate has been performed using two approved test methods ASTM 1664A/USEPA 1664A and the Ontario Ministry of the Environment protocol for testing of hydro carbons in water.

Also the test method DWI-DEP-003 when testing all the components of the Sorbweb™Plus system show conclusively that Sorbweb™Plus will contain all the hydro carbons should there be a failure of the oil filled equipment.

APPENDIX L2

Soil Movement Plan

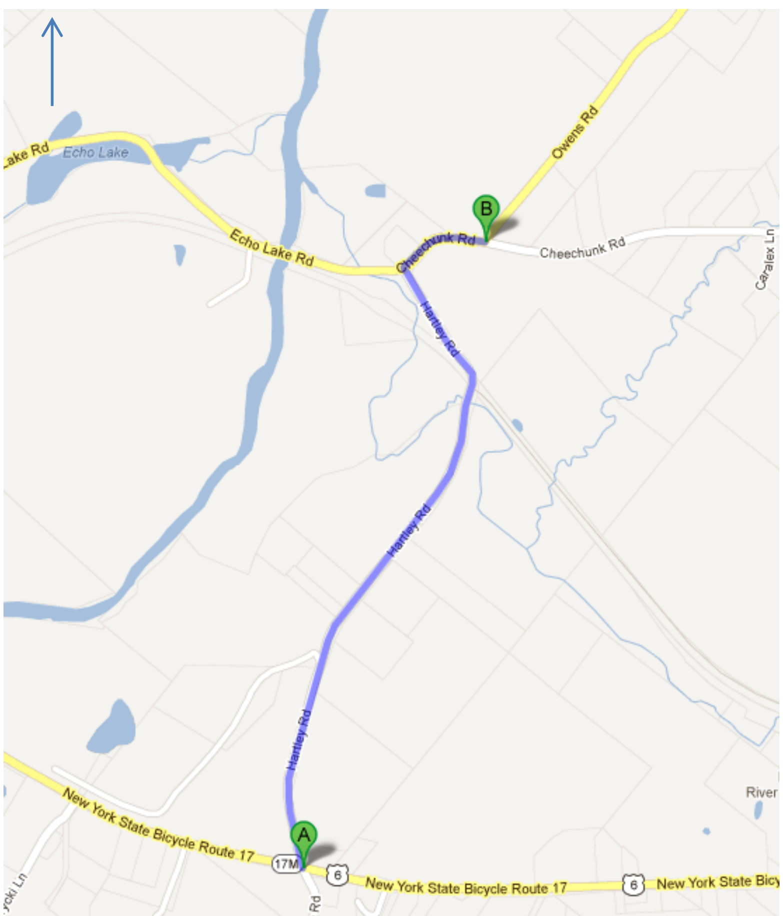
Soil Movement Plan

Purpose:This Soil Movement Plan (SMP) has been prepared to detail the importation of approximately 1,852 cubic yards of soil to the site for the construction of the proposed berm.

Details: It is estimated that 93 truckloads containing 20 cubic yards of soil per truckload will be required for this activity and that the fill will be delivered at a frequency of approximately 1 truckload per half hour throughout the day except that no deliveries will be made during the morning peak hour (from 7-8am). There will be an average of 14 truck deliveries per working day for approximately 7 days. Excluding weekends and days lost due to adverse weather, berm construction is expected to take approximately ten working days.

Local road weight restrictions: The Goshen Town Code restricts the gross weight of trucks on local roads to 5 tons per truck. Clearly, the average truck weight of the delivery trucks will be greater than the local road restriction but will be approximately equivalent to the weight of garbage/snow plow trucks. These soil deliveries are considered local deliveries and are allowed, as verified by the Town Highway Superintendent.

Description of the proposed trucking route: From Route 17M, turn north onto Hartley Road, turn right onto Cheechunk Road and drive east 650 feet to the proposed access driveway to the Site on the right.



APPENDIX M
Archaeological Survey

APPENDIX N
Subsurface Investigation

APPENDIX O

Magnetic Field Modeling Assessment Report & Addendum Reports

MAGNETIC FIELD
MODELING ASSESSMENT

FOR THE

PROPOSED HARTLEY SUBSTATION

Prepared for
Orange & Rockland Utilities, Inc.
390 Route 59
Spring Valley, NY 10977

Prepared by
Enertech Consultants
494 Salmar Avenue, Suite #200
Campbell, California 95008

April 16, 2012

NOTICE

Prepared by
Enertech Consultants of Santa Clara, Inc.
Campbell, California

EXECUTIVE SUMMARY

Orange & Rockland Utilities, Inc. is proposing to construct a new electric power substation, the "Hartley Substation", which is located outside the town of Goshen, in Orange County, New York. Orange & Rockland retained Enertech to perform a magnetic field assessment for the existing site and for the proposed substation configuration. This evaluation consisted of computer modeling of the power-frequency magnetic fields resulting from operation of the substation.

A computer model was developed for the existing site and for the proposed substation based upon engineering and design drawings supplied by Orange & Rockland. Once each of the models was developed, magnetic field calculations were performed using loading information provided by Orange & Rockland. Calculations were performed around the proposed substation location, as well as creating contour maps of the immediate area surrounding the substation site.

The existing site presently has two overhead 69 kV transmission lines and one overhead 138 kV transmission line routed through a portion of the site. Calculated magnetic field levels along the proposed substation property line reach 29.1 mG at the location where the existing 138 kV transmission line crosses the proposed property line (under 2012 peak loading conditions). Field levels attenuate with distance away from the transmission line.

For the proposed Hartley Substation configuration, calculated magnetic field levels range from about 0.0 mG to 30.5 mG around the substation location for a 2012 projected Peak loading scenario. The location where the highest magnetic field levels are calculated around the proposed substation location are where the existing overhead 69 kV transmission line circuits (Lines 24 and 25) cross the property line. Increased magnetic field levels also occur over the six underground 13.2 kV distribution lines exiting the substation onto Cheechunk Road (about 7.5 mG for the 2012 projected Peak loading scenario).

Presently, there are no federal health-based magnetic field standards. Although there are no federal health standards in the United States specifically for 60 Hertz magnetic fields, some organizations have developed guidelines: the International Commission on Non-Ionizing Radiation Protection (ICNIRP), the American Conference of Governmental Industrial Hygienists (ACGIH), and the Institute of Electrical and Electronics Engineers (IEEE). All of these guidelines are much higher than the calculated magnetic field levels around the proposed substation (maximum of 30.5 mG). In addition, there are at least two states that have adopted engineering-based guidelines or standards for transmission line magnetic fields (New York and Florida). The state of New York has a 200 mG limit at the edge of the right-of-way for overhead transmission lines under maximum loading conditions. Calculated magnetic field levels along the proposed property line of the substation are again much lower than this state limit.

Calculated magnetic field levels are based on computer modeling of the existing power line and the proposed substation design and loading as provided by Orange & Rockland. If the proposed substation design or loading conditions differ significantly from modeled conditions, then calculated magnetic field levels could differ significantly from those presented in this report.

1.0 INTRODUCTION

Orange & Rockland Utilities, Inc. is proposing to construct a new electric power substation, the "Hartley Substation", which is located outside the town of Goshen, in Orange County, New York. Orange & Rockland has proposed to construct this substation to address increased load demands from customers within the immediate area. Orange & Rockland retained Enertech to perform a magnetic field assessment for the proposed substation project. This evaluation consisted of computer modeling of the power-frequency magnetic fields for the existing overhead transmission lines present at the proposed substation site (two 69 kV transmission lines - Lines 24 and 25, and one 138 kV transmission line - Line 27) under 2012 peak loading conditions, and for the proposed substation configuration with associated transmission line modifications under a projected loading condition.

The proposed Hartley Substation would tap into an existing 69 kV transmission line (Line 24), routing it into the proposed substation and routing a new 69 kV transmission line (Line 241) back onto the existing right-of-way. Three new utility poles would be installed at the tap location to replace an existing utility pole. Two new steel utility poles would also be installed to route the overhead 69 kV transmission lines (Lines 24 and 241) from the existing right-of-way into the proposed substation. The proposed Hartley Substation would convert 69 kV electrical power to 13.2 kV, utilizing two transformers, circuit breakers, buswork, and a control house with switchgear. Underground distribution feeders would supply 13.2 kV electric power from the substation to nearby customers. Magnetic fields were calculated for this proposed substation and transmission line configuration using a 2012 projected Peak loading condition.

This report describes the magnetic field evaluation which Enertech performed. Section 2 of this report provides a general description of magnetic fields. Section 3 describes the computer modeling software used for the magnetic field calculations. Section 4 provides a description of the existing site, the proposed substation configuration, the computer model for the proposed substation configuration under various load conditions, and the calculation results. Section 5 discusses various standards and guidelines, while Section 6 presents a discussion of the computer modeling results and report conclusions.

2.0 MAGNETIC FIELDS – GENERAL DESCRIPTION AND UNITS OF MEASURE

2.1 GENERAL DESCRIPTION OF MAGNETIC FIELDS

Any object with an electric charge on it has a voltage (potential) at its surface and can create an electric field [(1)]. When electrical charges move together (an electric current), they create a magnetic field which can exert forces on other electric currents. All currents create magnetic fields [(1, 2, 3, 4)]. Magnetic fields occur throughout nature and are one of the basic forces of nature. The strength of the magnetic field depends on the magnitude of the current, the configuration/size of the source, spacing between conductors, and distance from the source[1].
Magnetic fields can be unchanging in direction (also called static), as in the case of direct current (DC), or alternating in direction, as in the case of alternating current (AC). Static magnetic fields

[1] Electric fields are a function of voltage, while magnetic fields are a function of current. Magnetic field levels can increase due to changes in current (loading) and phasing arrangement/configuration. Lower voltage lines may have higher loads, which may produce higher magnetic fields. Higher voltage lines may have lower loads, but due to increased phase separation, may also have higher magnetic fields.

occur in nature. The earth has a natural static magnetic field of about 550 mG (0.550 Gauss) in the Orange County, New York area [5]. Some electrical devices operate on a DC system, while others operate on an AC system. The magnetic field from AC sources (such as most electrical power lines, electrical equipment, residential wiring and appliances) changes direction at a rate of 60 cycles per second or 60 Hertz [1].

Magnetic fields are vector fields that have both direction and magnitude as a function of position relative to the field source [4]. Magnetic fields produced by electric currents are also time-varying phasors at the same frequency as the current (60 Hertz power-frequency) [4, 6]. Since magnetic fields can vary due to location from a source and at different points in time, magnetic field measurements represent a snapshot in time of magnetic field levels [4]. Since the vector components and phase angles of the magnetic field are not always known, the root-mean-square (rms) value of the magnetic field is often used to characterize the intensity of the field, despite its complicated variations in space and time (B_{rms}=SQRT[$B_x^2 + B_y^2 + B_z^2$]) [7].

Magnetic fields can be present due to a variety of different field sources. Contributions from multiple field sources are not simply cumulative in determining the resulting magnetic field level, since magnetic fields are vectors and phasors, and thus, add vectorially [4]. When the vectors are in opposite directions the fields cancel, and when the vectors are in the same direction they add. The magnetic field at any point in space is the vector sum of the field contributions from all sources (at each instant in time) [4]. Magnetic fields from multiple sources are influenced by the distance relative to each source, the amount of current on each source, and the configuration of the source (i.e., the arrangement of the current-carrying conductors associated with the source). Since the spatial and time components of magnetic fields from various sources are not always known, a good estimation of their additive effect assumes that they will add in quadrature as an rms value. For example, if an appliance produces a magnetic field of 10 mG and the magnetic field near a wall is 1 mG, then the resulting magnetic field would be:

$$\sqrt{10^2 + 1^2} = 10.05 \text{ mG.}$$

Power frequency magnetic fields are encountered frequently in everyday life. For example, typical AC household appliances produce magnetic fields. The magnetic field for a large number of appliances was measured by the Illinois Institute of Technology Research (IITRI) for the U.S. Navy [8] and by Enertech [9] for the Electric Power Research Institute (EPRI). Typical values for appliances are presented in Table 1.

2.2 UNITS OF MEASURE

Magnetic flux densities (B) are reported in units of gauss (G), or more typically in units of milliGauss (mG), which are equal to one-thousandth of a gauss (i.e., 1 mG = 0.001 G). Some technical reports also use the unit Tesla (T) or microTesla (µT; 1 µT = 0.000001 T) for magnetic flux densities. The conversion between these units is 1 mG = 0.1 µT and 1 µT = 10 mG.

Table 1
Magnetic Fields From Household Appliances [8]

Appliance	AC Magnetic Field (mG) 12" Away	AC Magnetic Field (mG) Maximum
Electric Range	3 to 30	100 to 1,200
Electric Oven	2 to 5	10 to 50
Garbage Disposal	10 to 20	850 to 1,250
Refrigerator	0.3 to 3	4 to 15
Clothes Washer	2 to 30	10 to 400
Clothes Dryer	1 to 3	3 to 80
Coffee Maker	0.8 to 1	15 to 250
Toaster	0.6 to 8	70 to 150
Crock Pot	0.8 to 1	15 to 80
Iron	1 to 3	90 to 300
Can Opener	35 to 250	10,000 to 20,000
Mixer	6 to 100	500 to 7,000
Blender, Popper, Processor	6 to 20	250 to 1,050
Vacuum Cleaner	20 to 200	2,000 to 8,000
Portable Heater	1 to 40	100 to 1,100
Fans/blowers	0.4 to 40	20 to 300
Hair Dryer	1 to 70	60 to 20,000
Electric Shaver	1 to 100	150 to 15,000
Color TV	9 to 20	150 to 500
Fluorescent Fixture	2 to 40	140 to 2,000
Fluorescent Desk Lamp	6 to 20	400 to 3,500
Circular Saws	10 to 250	2,000 to 10,000
Electric Drill	25 to 35	4,000 to 8,000

3.0 DESCRIPTION OF THE COMPUTER MODELING SOFTWARE

A computer model was developed of the proposed Hartley Substation to calculate magnetic field levels associated with its operation. The software program "EMF Workstation 2009", which is the latest EPRI magnetic field computer modeling program, was used to perform these magnetic field calculations. The EMF Workstation 2009 software can model the magnetic fields in and around transmission and distribution substations. EMF Workstation 2009 can also model substation equipment such as underground cables, power transformers, buswork, circuit breakers, and capacitor banks. The software can produce two-dimensional magnetic field contour maps of the calculation results, as well as calculation values along a predefined route.

4.0 DESCRIPTION AND MODELING OF THE PROPOSED HARTLEY SUBSTATION

4.1 DESCRIPTION OF THE EXISTING SUBSTATION SITE

The proposed Hartley Substation site is a vacant wooded property located outside the town of Goshen in Orange County, New York. The site is bounded to the west by Hartley Road, to the north by Echo Lake Road, and Cheechunk Road and to the east by forested private property. Presently there is a double circuit 69 kV transmission line (Lines 25 and 24) and a single circuit 138 kV transmission line (Line 27) which is routed northwest-to-southeast across a portion of the proposed substation site (on the southern edge of the proposed substation site).

Figure 1 presents an aerial photograph of the existing site. The location of the proposed substation property line boundary is shown as a blue outline in the figure. The location of the proposed substation is also overlaid onto the figure. Existing overhead 69 kV and 138 kV transmission lines are located along the southern portion of proposed substation site and cross a portion of the property site.

Figure 1. The Proposed Hartley Substation Property Site with Property Line Boundary and Existing Transmission Lines

4.2 DESCRIPTION OF THE PROPOSED HARTLEY SUBSTATION

The proposed Hartley Substation would convert 69 kV electrical power to 13.2 kV electrical power for distribution to neighboring consumers. The proposed substation would be an outdoor substation, with two transformers, circuit breakers, buswork, and control house with switchgear.

One of the existing 69 kV transmission lines (Line 24, which is closest to the proposed substation) would be tapped to provide electrical power into the substation. Line 24 would be routed into the proposed substation and a new 69 kV transmission line (Line 241) would be routed back onto the existing right-of-way. These two 69 kV circuits would be connected through buswork inside of the substation. Two power transformers would also be connected through this buswork, where 69 kV electrical power would be converted to 13.2 kV electrical power. The 13.2 kV electrical power would be routed through buswork into switchgear and distributed to six proposed 13.2 kV underground distribution circuits. The six underground circuits would be routed out of the substation along the driveway access road to connect into the existing distribution system (two circuits routed to Owens Road and the four remaining circuits to Cheechunk Road, with two circuits ending along Hartley Road).

Three new utility poles would be installed at the tap location to replace an existing utility pole. These new poles would support the three 69 kV transmission lines (Lines 24, 25, and 241) and allow the two transmission lines (Lines 24 and 241) to enter and exit the right-of-way for routing to the proposed substation. The existing utility pole at this location would be removed. Two new steel utility poles would also be installed to route the overhead 69 kV transmission lines (Lines 24 and 241) from the existing right-of-way over to the proposed substation.

Figure 2 presents a diagram of the proposed Hartley Substation overlaid onto an aerial photograph of the property site. As shown in Figure 2, one of the existing 69 kV transmission line circuits (Line 24) is tapped and routed into the proposed substation. The new 69 kV transmission line circuit (Line 241) is routed back from the substation to the existing transmission line right-of-way. Underground distribution circuits, shown as pink lines in Figure 2, are routed from the proposed substation down the substation access road to surrounding streets to connect into the existing distribution system.

Figure 3 presents a detailed drawing of the proposed substation as prepared by Orange and Rockland. This figure illustrates the layout of the substation equipment, including the substation buswork, transformer locations, circuit breakers, and control house/switchgear locations.

Figure 2. The Proposed Hartley Substation Computer Model Overlaid Onto an Aerial Photograph of the Property Site

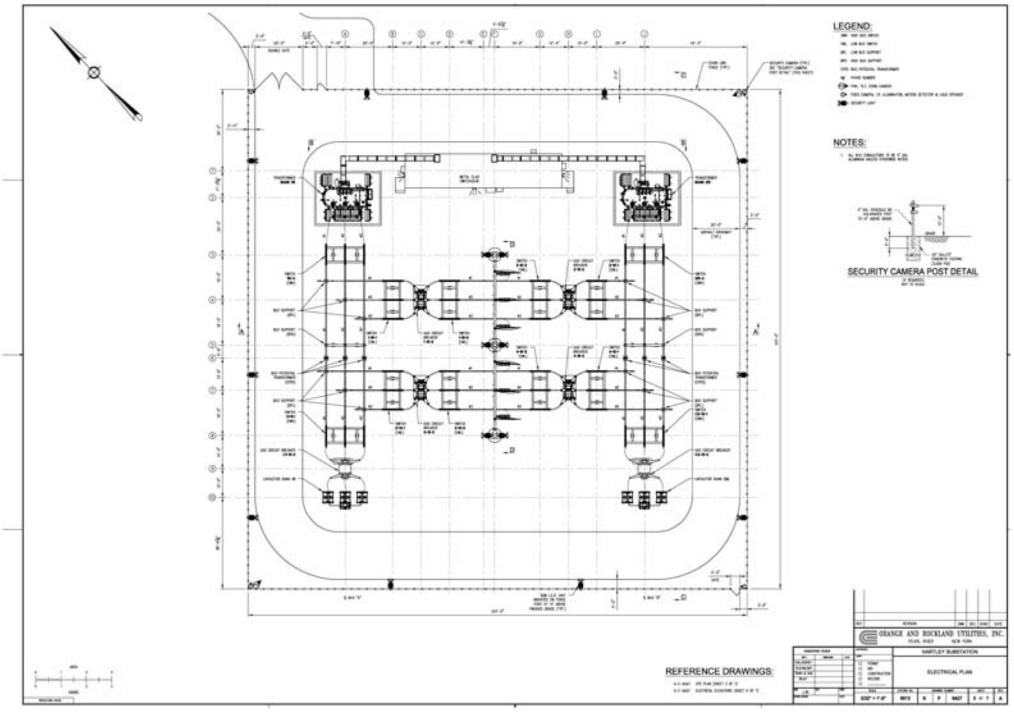


Figure 3. Drawing of the Proposed Hartley Substation

4.3 SUBSTATION GEOMETRY INFORMATION

A computer model was developed for the existing site and for the proposed Hartley Substation. Each computer model was developed using various engineering drawings, one-line diagrams, plan & profile drawings, phasing and loading conditions, and other information provided by Orange & Rockland.

Loading information for the transmission and distribution circuits was provided by Orange & Rockland. For loading within the proposed substation switchgear, a 90% reduction factor was assumed. This reduction was modeled to represent the shielding factor caused from the metal-clad switchgear cabinets which houses the energized conductors. For the underground distribution circuits a 75% load reduction was applied to represent the magnetic field shielding factor caused from multi-point grounding of metallic cable sheaths and resulting eddy current reductions to the magnetic fields along the underground duct routes to Cheechunk Road, Owens Road, Echo Lake Road, and Hartley Road.

For the existing overhead 69 kV transmission lines (Lines 24, and 25) and 138 kV transmission line (Line 27), a peak 2012 loading was reported by Orange & Rockland as:

- Line 24 = 177 Amps
- Line 25 = 321 Amps
- Line 27 = 762 Amps

For the proposed substation configuration, a 2012 projected Peak loading scenario was used based upon equipment specifications by Orange & Rockland. Loading conditions for the proposed Hartley Substation are illustrated in Figure 4 for the 2012 projected load.

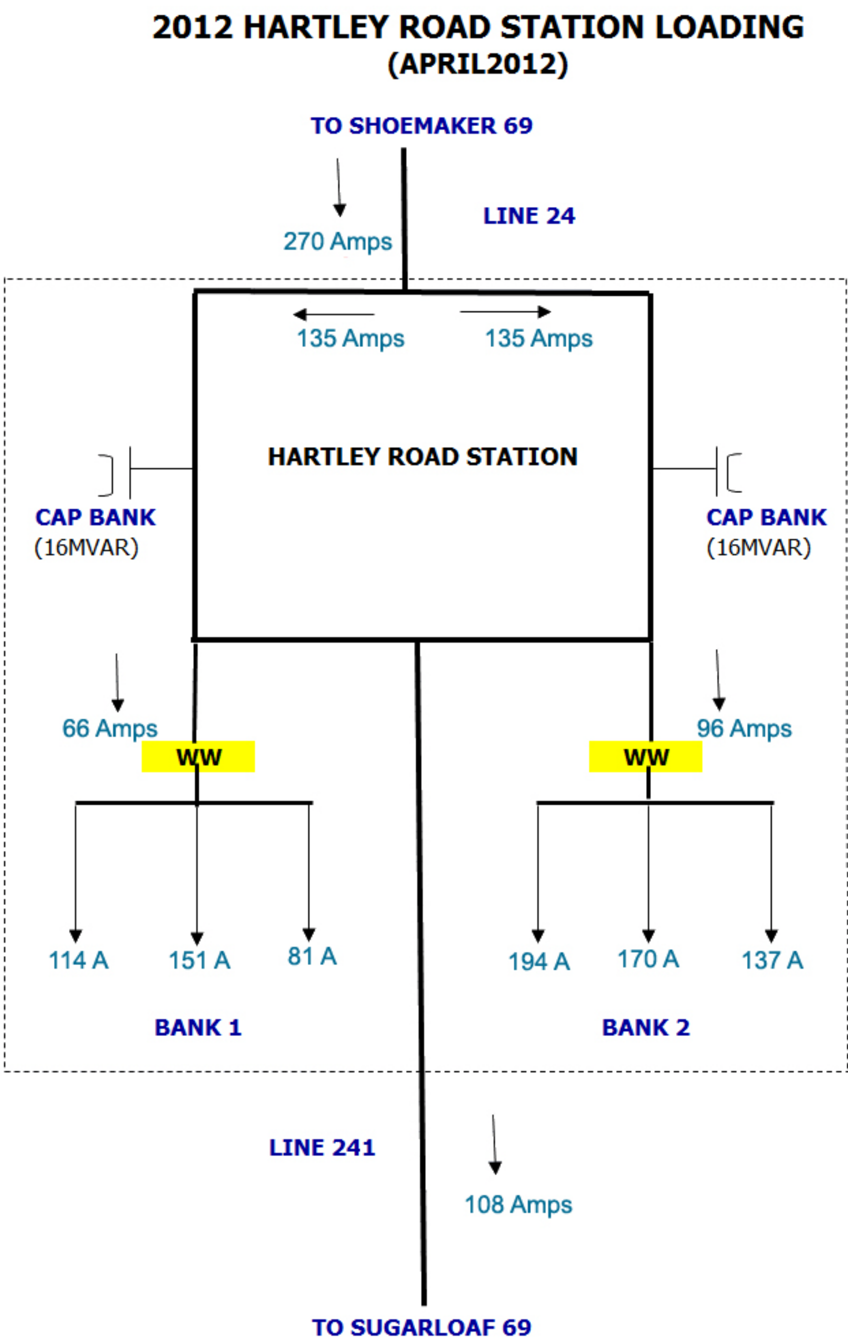


Figure 4. Projected 2012 Peak Load Case Used for Computer Modeling of the Proposed Hartley Substation

4.4 MODELING RESULTS FOR THE EXISTING CONFIGURATION

A calculated magnetic field contour map is presented in Figure 6 for the existing double circuit 69 kV transmission lines and the single circuit 138 kV transmission line configuration under 2012 peak loading conditions. The computer model calculated magnetic field levels at a height of 1 meter above ground in accordance with IEEE Standards (10,11). Contour levels are shown in units of mG.

As shown in Figure 5, the existing overhead 69 kV transmission lines (Lines 24 and 25) and the 138 kV transmission line (Line 27) are the dominant magnetic field source within the proposed property site. The highest calculated magnetic field level for the existing overhead transmission line configuration is approximately 29.1 mG near centerline of the 138 kV. Field levels attenuate with distance away from the transmission lines.

Figure 5. Calculated Magnetic Field Contour Map for the Existing Line Configuration Under Peak 2012 Loading Conditions (in mG)

Magnetic field calculations were also performed along the profile path around the substation location. Figure 6 presents a diagram of the profile path used for these field calculations. The profile begins near the southwest corner of the proposed substation property line and proceeds in a clockwise direction around the proposed substation location. The southernmost section of the Hartley Substation property was not included in these calculations due to the distance from the substation and corresponding transmission lines. The magnetic fields in this section would be negligible.

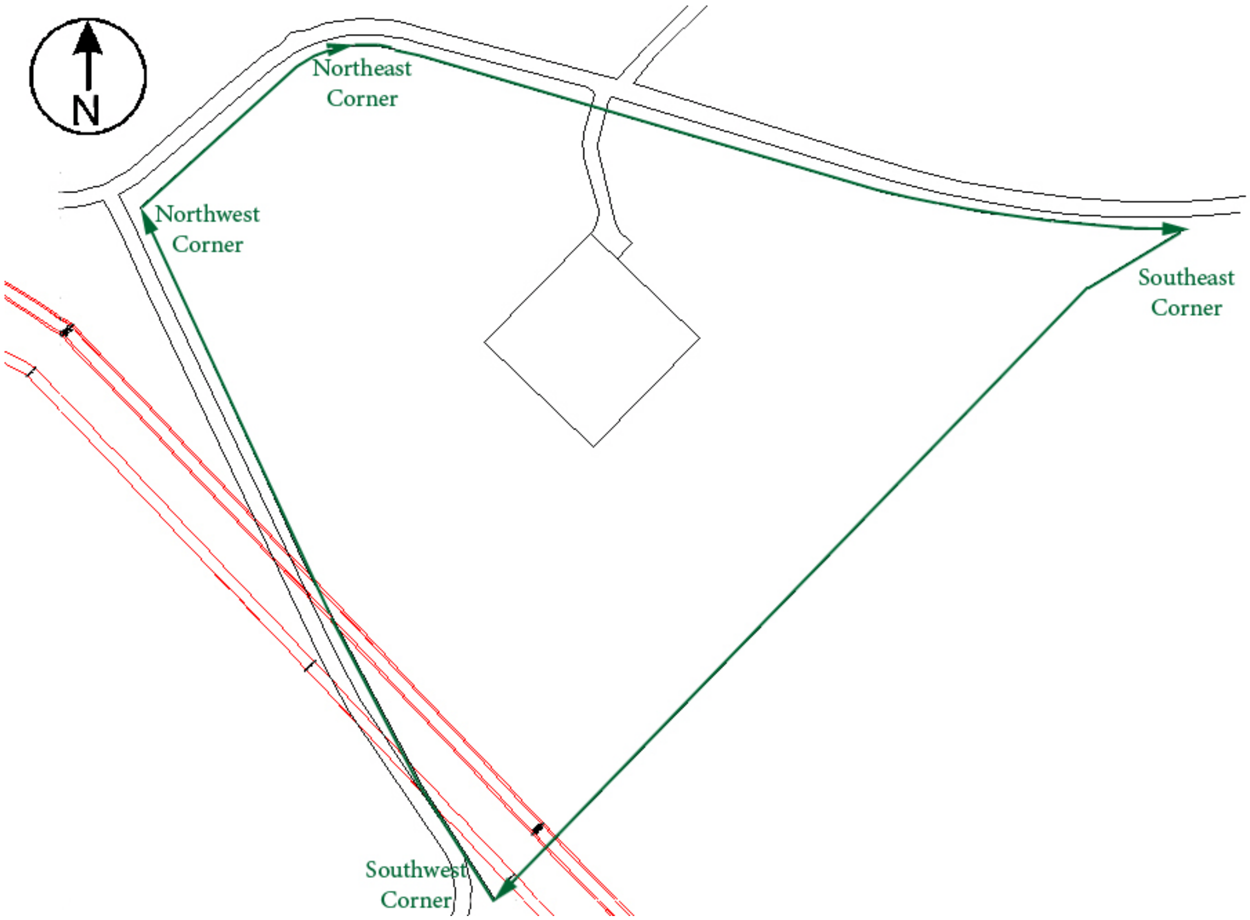


Figure 6. Profile Path for Magnetic Field Calculations Around the Proposed Hartley Substation Location For the Existing Site Configuration

The calculated magnetic field levels around the proposed substation location are presented in Figure 7 as a magnetic field versus distance graph. Calculated magnetic field levels along this profile range from about 0.0 mG to 29.1 mG, depending upon location. Calculated magnetic field levels increase at locations where the overhead transmission line circuits cross into the southwest corner of the proposed substation property.

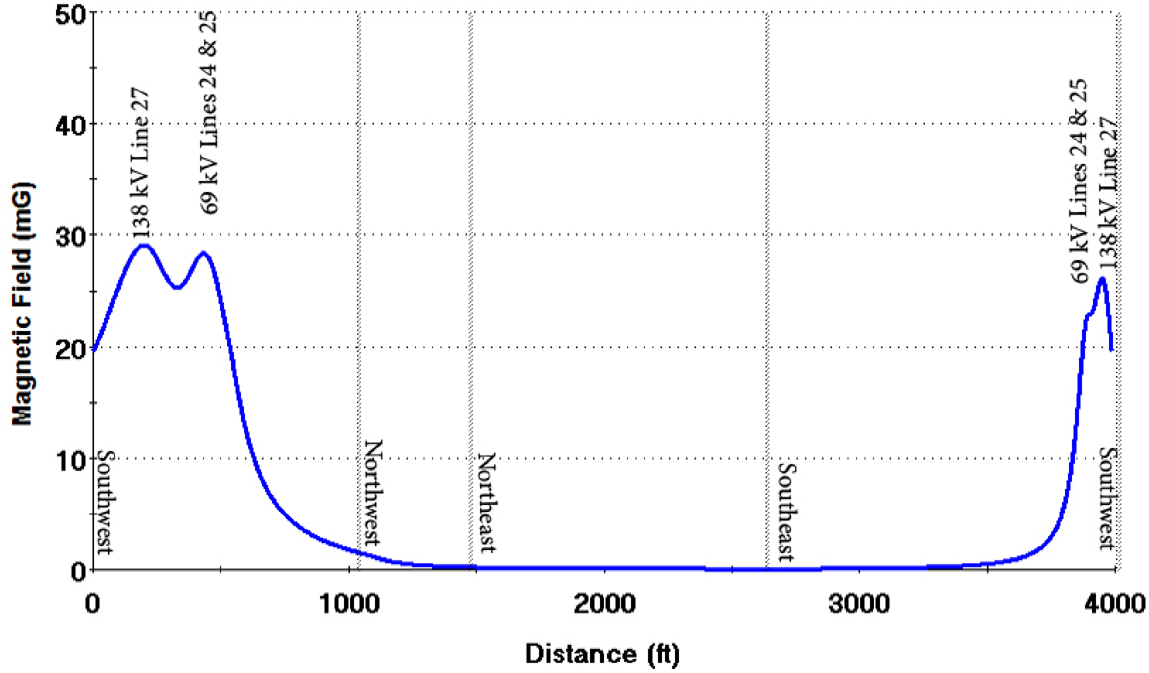


Figure 7. Profile Path for Magnetic Field Calculations Along the Proposed Hartley Substation Property Line

4.5 MODELING RESULTS FOR THE PROPOSED HARTLEY SUBSTATION

Based on the proposed substation design and modeling assumptions, the computer model calculated magnetic field levels projected around the proposed substation at a height of 1 meter above ground in accordance with IEEE Standards [10,11]. Figure 8 presents the calculated magnetic field contour map for the proposed substation with the new 69 kV transmission line and distribution line configuration for the 2012 projected loading scenario. The presence of the proposed substation and associated new overhead 69 kV transmission lines and new underground distribution lines contribute to the overall magnetic field levels in the immediate area near the proposed substation. Contour levels are shown in units of mG.

As shown in Figure 8 the calculated magnetic field extends into the proposed substation site due to the addition of the new 69 kV overhead circuits and the proposed substation equipment. Some magnetic field contours are also present due to the new 13.2 kV underground distribution circuits which exit the substation property from the access road and travel along Owens Road, Cheechunk Road, Echo Lake Road, and Hartley Road.

Figure 8. Calculated Magnetic Field Contour Map for the Proposed Substation Configuration Under Projected 2012 Loading Conditions (in mG)

Magnetic field calculations were also performed around the proposed substation. Figure 9 presents a diagram of the profile path used for these field calculations. Similar to the profile path for the existing site configuration, the profile begins near the southwest corner of the proposed substation property and proceeds in a clockwise direction along the perimeter around the proposed substation.

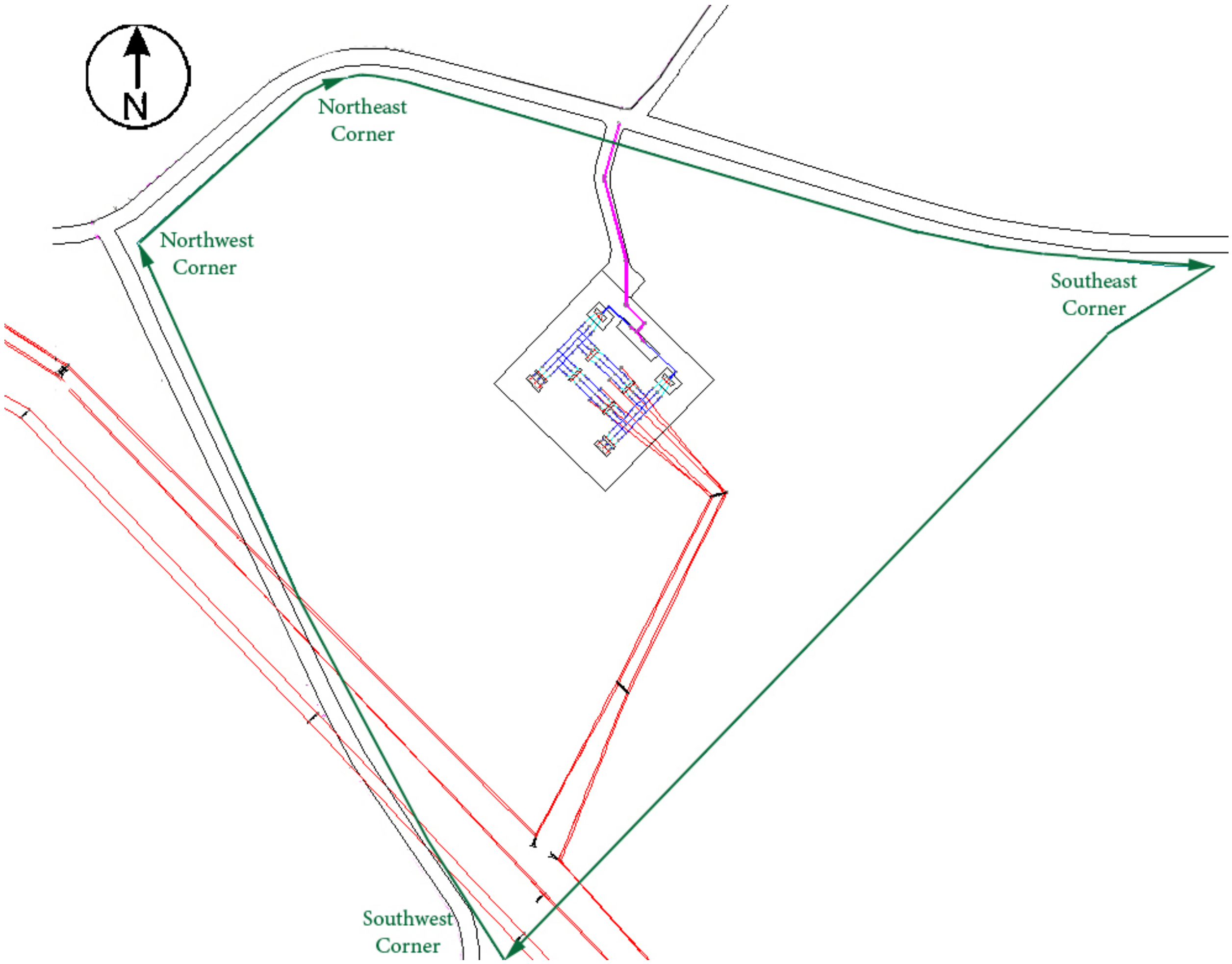


Figure 9. Profile Path for Magnetic Field Calculations Around the
Proposed Hartley Substation Location
For the Proposed Site Configuration

The calculated magnetic field levels around the proposed substation are presented in Figure 10 as a magnetic field versus distance graph for the projected 2012 Peak loading scenario. Calculated magnetic field levels along the proposed substation profile range from about 0.0 mG to 30.5 mG (depending upon location along the profile path) for a projected 2012 loading scenario, as shown in Figure 10. Calculated magnetic field levels increase at locations where the overhead and underground circuits enter and exit the substation property. For example, where the six underground distribution circuits exit the substation at Cheechunk Road, calculated magnetic field levels reach 7.5 mG for the projected 2012 loading scenario. The location where the highest magnetic field levels are calculated along the profile path are where the existing overhead 69 kV transmission line circuits (Lines 24 and 25) cross the property line.

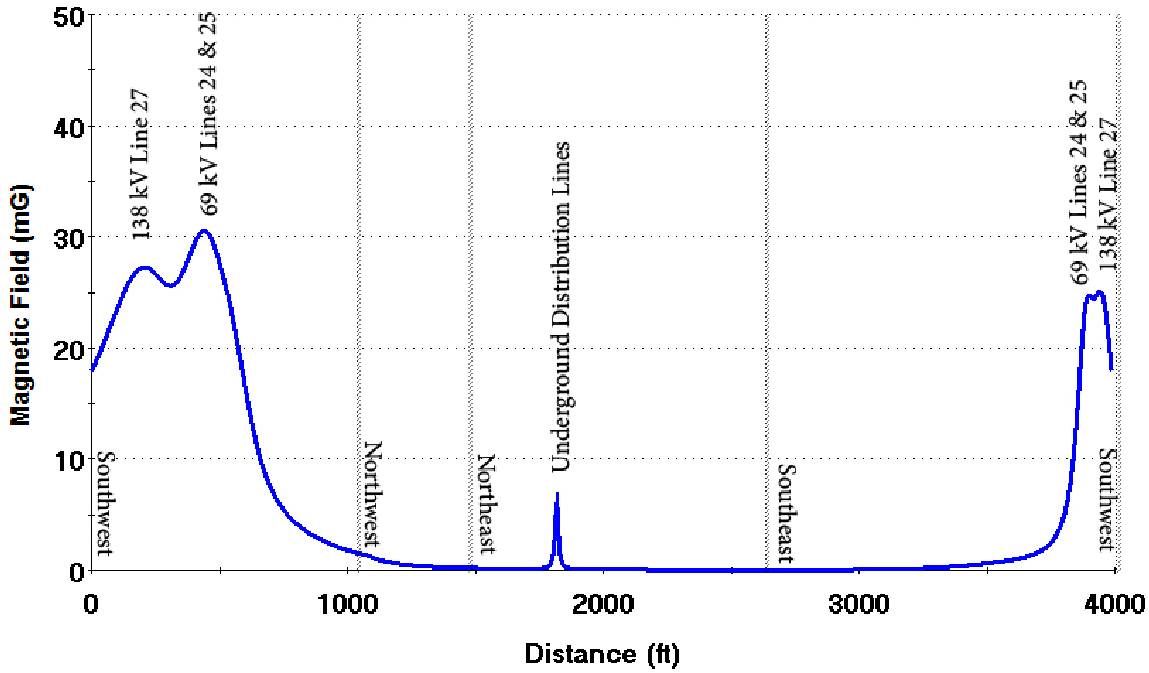


Figure 10. Calculated Magnetic Field Around the Proposed Substation Location for the Proposed Substation Configuration with a 2012 Projected Peak Loading Scenario (in mG)

5.0 STANDARDS AND GUIDELINES

Presently, there are no federal health-based magnetic field standards. Although there are no federal health standards in the United States specifically for 60 Hertz magnetic fields, two organizations have developed guidelines: the International Commission on Non-Ionizing Radiation Protection (ICNIRP)(12) and the American Conference of Governmental Industrial Hygienists (ACGIH)(13). Both of these guidelines are much higher than the calculated magnetic field levels around the proposed substation location (0.0 mG to 30.5 mG for 2012 projected peak loading). Tables 2 and 3 present a summary of the magnetic field levels of these guidelines respectively. Since it has not yet been determined whether magnetic field exposure constitutes a health hazard, it cannot be determined what levels of exposure are “safe” or “unsafe”.

Table 2
Summary of ICNIRP 50/60 Hz Exposure Guidelines

International Commission on Non-Ionizing Radiation Protection Guidelines	
Exposure (50/60 Hz)	Magnetic Field
Occupational :	
Reference Levels for Time-Varying Fields	4,167 mG (4.167 Gauss)
Current Density for Head and Body	5,000 mG (5 Gauss)
General Public :	
Reference Levels for Time-Varying Fields	833 mG (0.833 Gauss)
Current Density for Head and Body	1,000 mG (1 Gauss)

Table 3
Summary of ACGIH 60 Hz Exposure Guidelines

American Conference of Governmental Industrial Hygienists Guidelines	
Exposure (60 Hz)	Magnetic Field
Occupational :	
Exposure should not exceed	10,000 mG (10 Gauss)
For workers with cardiac pacemakers, the field should not exceed	1,000 mG (1 Gauss)

In addition, IEEE has published a standard regarding exposure to electromagnetic fields(14). Table 4 presents a summary of the 60 Hz electric and magnetic field levels for this standard. Again, calculated magnetic field levels at the proposed substation property line are much lower than the levels cited within the IEEE standard.

Table 4. Summary of IEEE 60 Hz Exposure Levels

IEEE Exposure Levels for 60 Hz Magnetic fields	
Exposure (60 Hz)	Magnetic Field
General public should not exceed	9,040 mG (9.04 Gauss)
Controlled environments should not exceed	27,100 mG (27.1 Gauss)

Finally, there are at least two states that have adopted engineering-based guidelines or standards for transmission line magnetic fields (New York and Florida). Table 5 [15] presents a summary of these state magnetic field standards. Calculated magnetic field levels along the proposed substation property line are also lower than both of these state guidelines.

Table 5. State Transmission Line Standards and Guidelines

State	Magnetic Field at ROW Edge
Florida	150 mG (max load)[a] 200 mG (max load)[b] 250 mG (max load)[c]
New York	200 mG (max load)

* ROW = right-of-way (or in Florida standard, certain additional areas adjoining the right-of-way).
a For lines of 69-230 kV.
b For 500 kV lines.
c For 500 kV lines on certain existing ROW.

Scientific research uses epidemiology studies, animal models, and laboratory studies of basic mechanisms to scientifically evaluate health issues. Based upon a comprehensive review of the scientific literature, the association between magnetic fields and adverse health effects is weak and some research is continuing. Many organizations (such as the National Institute of Environmental Health Sciences[15], World Health Organization[16], International Agency for Research on Cancer[17], National Cancer Institute[18], etc.) have reported that there is little or no scientific evidence supporting an association with EMF exposures and adverse health effects or disease risks. There is some evidence from epidemiology studies that exposure to power-frequency EMF is associated with an increased risk for childhood leukemia. However, this association is difficult to interpret in the absence of reproducible laboratory evidence or a causal scientific explanation.

For animals, many EMF studies have focused on various groups of animals, such as bees and cattle. Some studies have reported no effects resulting from EMF, while other studies found mixed results, with some studies indicating an effect from EMF while others did not. Researchers have also performed detailed short-term and long-term studies on laboratory animals with respect to EMF and diseases such as leukemia, breast cancer, skin cancer, brain cancer, reproductive defects, and others. Overall, animal studies do not support EMF health effects[(15)].

There is nothing new or unusual about a 69 kV substation. In fact, 69 kV facilities have been in service in the United States for over 100 years.

6.0 DISCUSSION AND CONCLUSIONS

The existing site presently has two overhead 69 kV transmission lines (Lines 24 and 25) and one 138 kV transmission line (Line 27) which cross a portion of the proposed substation site. The highest calculated magnetic field levels for the existing configuration are about 29.1 mG around the proposed substation location under 2012 peak loading conditions. This calculated field level occurs at the location where the existing 138 kV transmission line circuit crosses the proposed substation property line. Calculated magnetic field levels are as low as 0.0 mG around the substation property away from these existing transmission lines. Field levels attenuate with distance away from transmission lines.

For the proposed Hartley Substation configuration, calculated magnetic field levels range from about 0.0 mG to 30.5 mG around the proposed substation location for a 2012 projected Peak loading scenario. The location where the highest magnetic field levels are calculated around the proposed substation location are where the existing overhead 69 kV transmission line circuits (Lines 24 and 25) cross the property line. Calculated magnetic field levels also increase at locations where the proposed underground circuits are routed. The calculated magnetic field levels above the six 13.2 kV underground distribution lines exiting the substation are 7.5 mG for the projected 2012 peak loading scenario.

Presently, there are no federal health-based magnetic field standards. Although there are no federal health standards in the United States specifically for 60 Hertz magnetic fields, some organizations have developed guidelines: the International Commission on Non-Ionizing Radiation Protection (ICNIRP), the American Conference of Governmental Industrial Hygienists (ACGIH), and the Institute of Electrical and Electronics Engineers (IEEE). All of these guidelines are much higher than the calculated magnetic field levels along the proposed property line of the substation. In addition, there are at least two states that have adopted engineering-based guidelines or standards for transmission line magnetic fields (New York and Florida). The state of New York has a 200 mG limit at the edge of the right-of-way for overhead transmission lines under maximum loading conditions. Calculated magnetic field levels around the proposed substation site are again much lower than this state limit.

Calculated magnetic field levels are based on computer modeling of the existing power line and the proposed substation design and loading as provided by Orange & Rockland. If the proposed substation design or loading conditions differ significantly from modeled conditions, then calculated magnetic field levels could differ significantly from those presented in this report.

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ADDENDUM REPORT

ADDITIONAL MAGNETIC FIELD MODELING ASSESSMENT

FOR THE

PROPOSED HARTLEY SUBSTATION

Prepared for
Orange & Rockland Utilities, Inc.
390 Route 59
Spring Valley, NY 10977

Prepared by
Enertech Consultants
494 Salmar Avenue, Suite #200
Campbell, California 95008

April 18, 2012

NOTICE

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Prepared by
Enertech Consultants of Santa Clara, Inc.
Campbell, California

EXECUTIVE SUMMARY

Orange & Rockland Utilities, Inc. is proposing to construct a new electric power substation, the "Hartley Substation", which is located outside the town of Goshen, in Orange County, New York. Orange & Rockland retained Enertech to perform a magnetic field assessment for the existing site and for the proposed substation configuration. A report was prepared, dated October 6, 2010, and revised on April 16, 2012, which presented the results of this evaluation. Subsequent to this report, Enertech was asked to evaluate the differences in calculated magnetic field if the overhead 69 kV transmission line tap were reconfigured as an underground 69 kV tap with associated transition structures. The results of this additional assessment are presented in this addendum report.

Computer models were developed of the proposed substation based upon engineering and design drawings supplied by Orange & Rockland and from a previous transition structure project utilized by Orange & Rockland. The overhead transmission line configuration was reconfigured to an underground duct configuration, and routed along the same proposed path into the Hartley Substation where the conductors would then transition back to an overhead configuration.

Computer modeling results indicate that there is very little change in the calculated magnetic field between the proposed overhead and underground configurations, particularly for areas outside of the substation property. Along the proposed substation property line, calculated magnetic field levels for an overhead configuration, range from about 0.0 mG to 30.5 mG along the substation property line for a proposed 2012 Peak loading scenario. Calculated magnetic field levels for an underground tap configuration are similar, ranging from about 0.0 mG to 30.7 mG. The overhead transmission line does not transition to an underground configuration until inside of the substation property.

There are elevated fields as the property line profile passes near the transition structure, about 6.8 mG with the overhead transmission configuration and about 10.2 mG for the underground configuration. The magnetic fields above the underground 69 kV transmission line conductors are reduced in comparison to the overhead transmission line conductors due to a 75% load reduction representing the magnetic field shielding factor (caused from multi-point grounding of metallic cable sheaths and resulting eddy current reductions along the underground duct routes) and there is also an increased shielding factor due to the close conductor spacing. The magnetic fields attenuate at a faster rate when comparing underground conductors to overhead conductors (due to the closer spacing). Overall the major contributors to the magnetic fields around the property line are still the existing overhead transmission lines to the west of the proposed substation, regardless of whether the tap is configured as overhead or underground.

Calculated magnetic field levels are based on computer modeling of the proposed overhead power lines and the proposed underground design with loading provided by Orange & Rockland. If the proposed substation designs or loading conditions differ significantly from modeled conditions, then calculated magnetic field levels could differ significantly from those presented in this addendum report.

1.0 INTRODUCTION

Orange & Rockland Utilities, Inc. is proposing to construct a new electric power substation, the "Hartley Substation", which is located outside the town of Goshen, in Orange County, New York. An evaluation of the calculated magnetic fields associated with the operation of the substation was performed and a report, entitled "MAGNETIC FIELD MODELING ASSESSMENT FOR THE PROPOSED HARTLEY SUBSTATION" was issued on October 6, 2010, and revised on April 16, 2012. In this report, the proposed transmission design was for an overhead line configuration into the substation. Subsequent to this report, an evaluation was performed to characterize the differences in calculated magnetic field if the overhead 69 kV transmission line tap were reconfigured as an underground 69 kV tap with associated transition structures. The results of this additional underground line configuration assessment are presented in this addendum report.

2.0 OVERHEAD VERSUS UNDERGROUND CONFIGURATIONS

The original overhead transmission line design that was proposed for the Hartley Substation was an overhead tap into an existing 69 kV transmission line (Line 24), routing it overhead into the proposed substation, and routing a new overhead 69 kV transmission line (Line 241) back onto the existing right-of-way. Three new utility poles would be installed at the tap location to replace an existing utility pole. Two new steel utility poles would also be installed to route the overhead 69 kV transmission lines (Lines 24 and 241) from the existing right-of-way into the proposed substation.

The proposed underground configuration consists of installing a new overhead-to-underground transition structure near the overhead line tap. This structure would route the existing transmission line (Line 24) into underground ducts and then into the substation. A second transition structure within the substation would allow the underground line to transition overhead and into the substation buswork. The new 69 kV transmission line (Line 241) would also be routed through the transition structure to the underground ducts, along the same proposed line route, and then transition overhead to the existing overhead configuration. Additional support poles would also be required at the tap location.

3.0 DESCRIPTION OF THE COMPUTER MODELING SOFTWARE

A computer model was developed of the proposed Hartley Substation to calculate magnetic field levels associated with its operation. The software program "EMF Workstation 2011", which is the latest EPRI magnetic field computer modeling program, was used to perform these magnetic field calculations. The EMF Workstation 2011 software can model the magnetic fields in and around transmission and distribution substations. EMF Workstation 2011 can also model substation equipment such as underground cables, power transformers, buswork, circuit breakers, and capacitor banks. The software can produce two-dimensional magnetic field contour maps of the calculation results, as well as calculation values along a predefined route.

4.0 COMPUTER MODELING RESULTS

4.1 MODELING RESULTS FOR THE OVERHEAD CONFIGURATION

The results of the computer modeling performed for the overhead configuration and presented in the October 6, 2010 report are shown in Figures 1 and 2. Figure 1 presents a calculated magnetic field contour map for the overhead configuration under 2012 peak loading conditions. The computer model calculated magnetic field levels at a height of 1 meter above ground in accordance with IEEE Standards [1,2]. Contour levels are shown in units of mG.

As shown in Figure 1, the existing overhead 69 kV transmission lines (Lines 24 and 25) and the 138 kV transmission line (Line 27), as well as the overhead transmission line tap into the proposed substation (Lines 24 and 241), are the dominant magnetic field sources within the proposed property site.

Figure 1. Calculated Magnetic Field Contour Map for the Proposed Overhead Tap Line Configuration Under Peak 2012 Loading Conditions (in mG)

The calculated magnetic field levels along the proposed substation property line are presented in Figure 2 as a magnetic field versus distance graph. Along the proposed substation property line, calculated magnetic field levels range from about 0.0 mG to 30.5 mG, depending upon location. Calculated magnetic field levels increase at locations where the existing overhead transmission line circuits cross the southwest corner of the proposed substation property. A smaller increase is seen at the location where the underground distribution lines cross the substation property line.

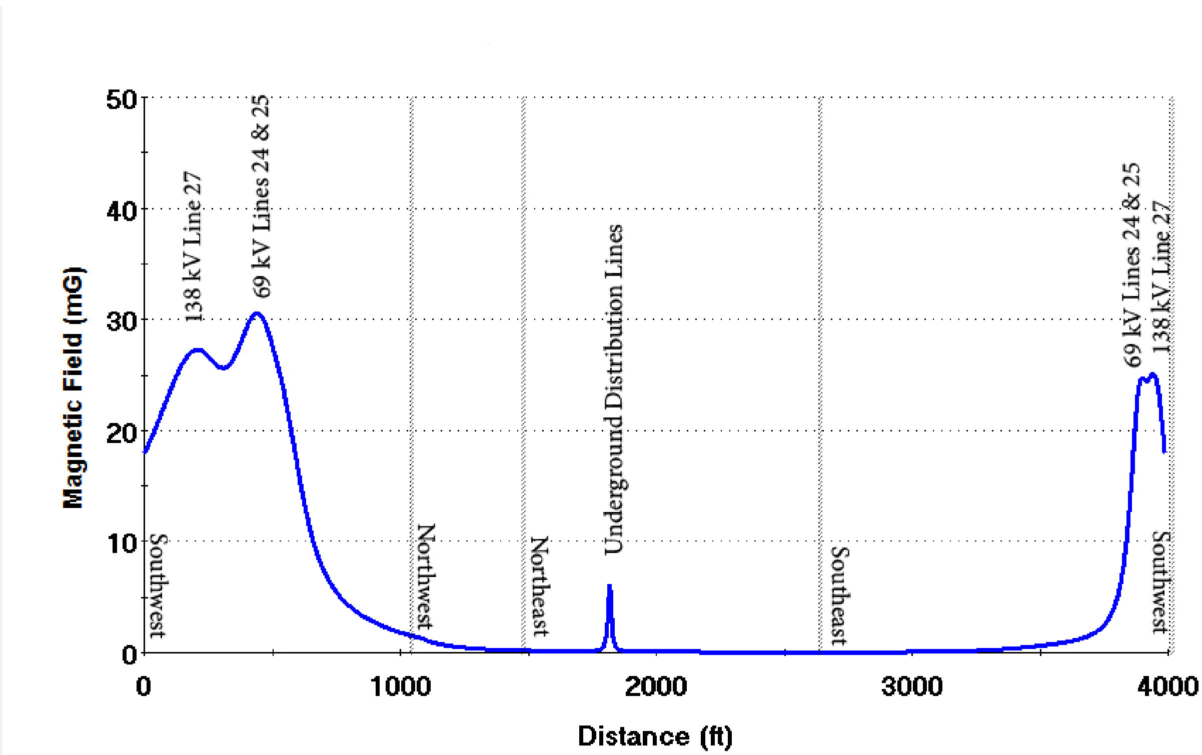

Figure 2. Calculated Magnetic Fields Along the Proposed Substation Property Line for the Proposed Substation Configuration with an Overhead Tap And a Peak 2012 Projected Loading Scenario (in mG)

4.2 MODELING RESULTS FOR THE UNDERGROUND CONFIGURATION

Based on transition structure drawings used by Orange & Rockland for other projects, as well as duct designs and other modeling assumptions, the computer model was modified for the proposed underground configuration. Magnetic field levels were then calculated around the proposed substation at a height of 1 meter above ground in accordance with IEEE Standards [1,2]. Figure 3 presents the calculated magnetic field contour map for the underground transmission line tap with the transition structures for the proposed substation (using the same projected 2012 peak loading scenario). The presence of the transition structures and associated new underground 69 kV transmission lines contribute to the overall magnetic field levels within the proposed substation property; however, the existing overhead transmission lines are still the dominant magnetic field sources along the western portion of the substation property site. Contour levels are shown in units of mG.

Figure 3. Calculated Magnetic Field Contour Map for the Proposed Underground Tap Line Configuration Under Peak 2012 Loading Conditions (in mG)

As shown in Figures 3, the calculated magnetic field increases locally near the transition structure as the 69 kV line transitions from overhead to underground circuits. Magnetic field contours are also present due to the 69 kV underground transmission circuits. However, calculated magnetic fields from the underground ducts attenuate much more quickly with distance in comparison to the overhead line configuration. Additional field reduction is also achieved from closer underground conductor spacing and magnetic field shielding due to the presence of multi-point grounding of metallic cable sheaths and the resulting eddy current reductions (simulated using a 75% load reduction factor).

Figure 4 presents the calculated magnetic field along the proposed substation property line as a magnetic field versus distance graph (for the projected 2012 peak loading scenario). Calculated magnetic field levels along the proposed substation property line range from about 0.0 mG to 30.7 mG (depending upon location along the profile path) and are virtually unchanged from the results for the overhead transmission line configuration. Calculated magnetic field levels again increase at locations where the overhead transmission and underground distribution circuits enter and exit the substation property. The location where the highest magnetic field level occurs along the proposed substation property line is along the western portion of the substation property, in the area where the existing overhead 69 kV transmission line circuits (Lines 24 and 25) cross into the substation property.

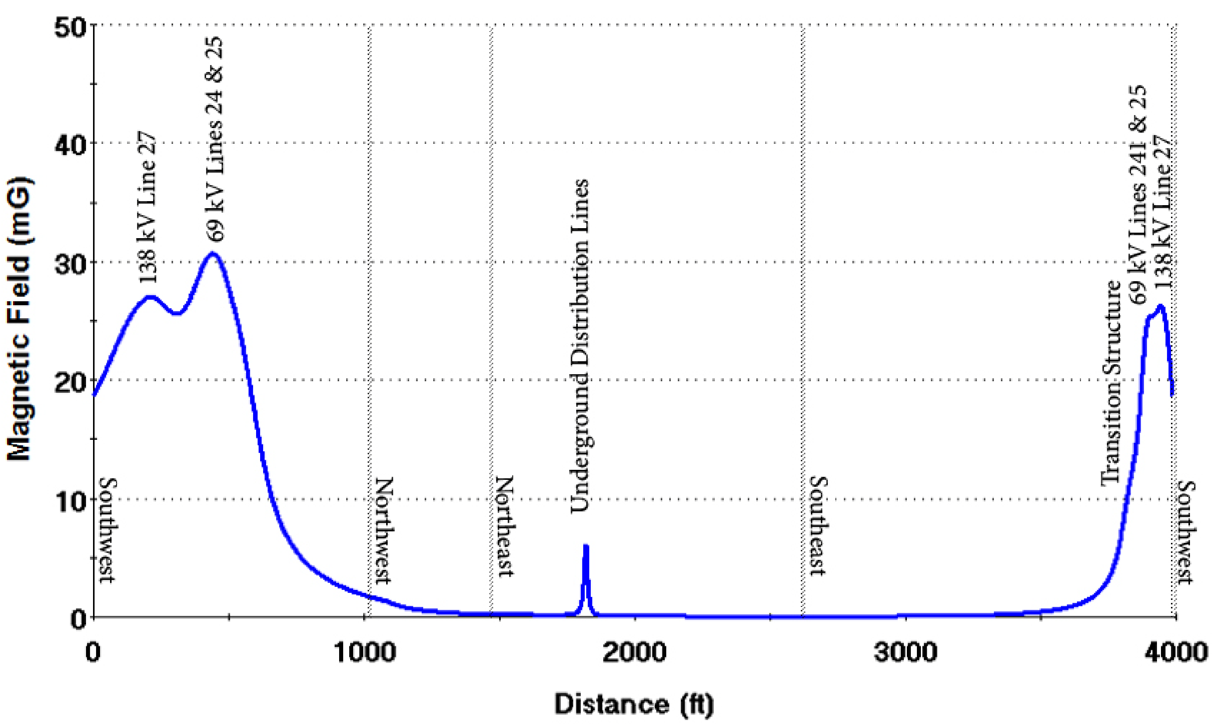

Figure 4. Calculated Magnetic Fields Along the Proposed Substation Property Line for the Proposed Substation Configuration with an Underground Tap And a Peak 2012 Projected Loading Scenario (in mG)

5.0 DISCUSSION AND COMPARISONS

For the proposed Hartley Substation configuration, calculated magnetic field levels range from about 0.0 mG to 30.5 mG along the proposed substation property line for a 2012 Peak loading scenario for the overhead configuration, and about 0.0 mG to 30.7 mG for the underground configuration. The location where the highest magnetic field level is calculated occurs along the proposed western substation property line where the existing overhead 69 kV transmission line circuits (Lines 24 and 25) cross the property line. Calculated magnetic field levels increase locally at the transition structures as the transmission lines transfer from overhead to underground. The magnetic field increases from about 6.8 mG with the overhead transmission configuration to 10.2 mG as the profile passes near the transition structure for the underground configuration. Magnetic fields are decreased over the underground ducts in comparison to the overhead transmission lines, but do not affect the magnetic fields along the property line or beyond.

Calculated magnetic field levels are based on computer modeling of proposed substation design and loading as provided by Orange & Rockland. If the proposed substation design or loading conditions differ significantly from modeled conditions, then calculated magnetic field levels could differ significantly from those presented in this addendum report.

6.0 REFERENCES

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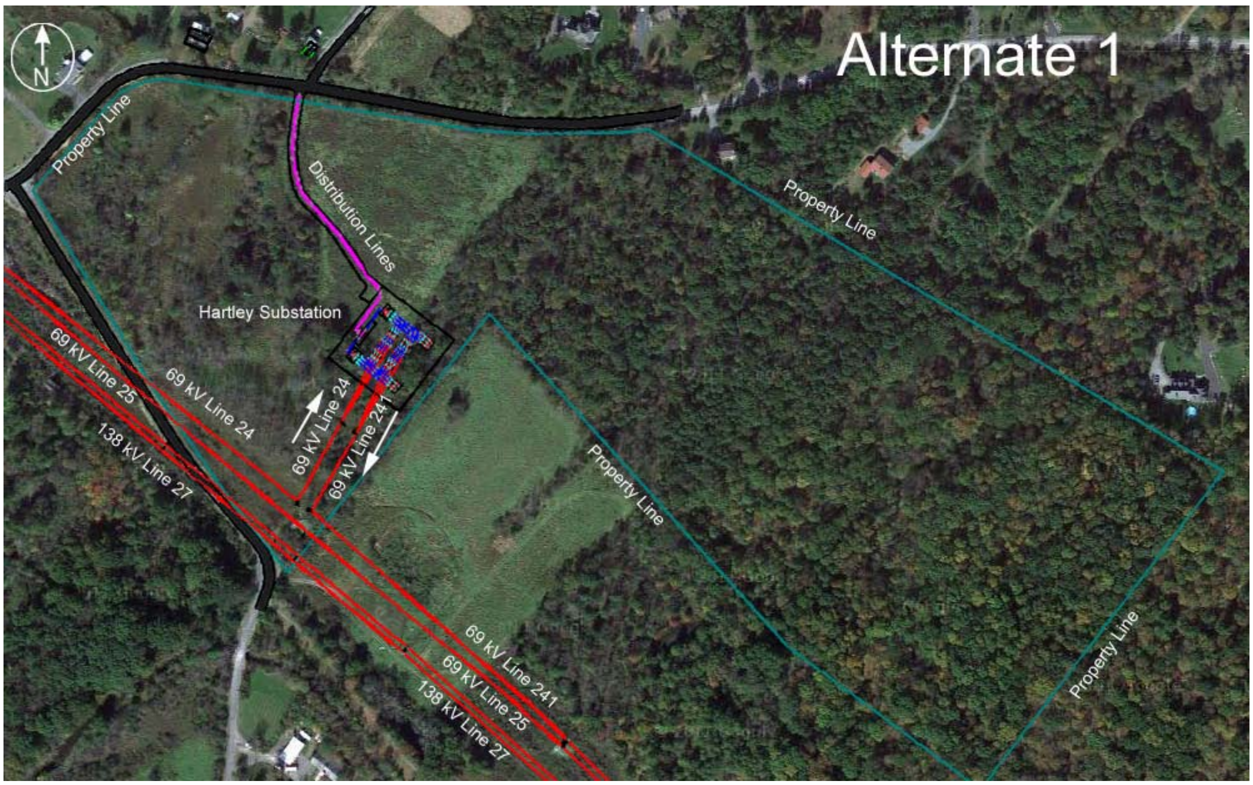
ALTERNATE 1 ADDENDUM REPORT

ADDITIONAL MAGNETIC FIELD MODELING ASSESSMENT

FOR THE

PROPOSED HARTLEY SUBSTATION



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April 18, 2012

NOTICE

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Prepared by
Enertech Consultants of Santa Clara, Inc.
Campbell, California

EXECUTIVE SUMMARY

Orange & Rockland Utilities, Inc. is proposing to construct a new electric power substation, the “Hartley Substation”, which is located outside the town of Goshen, in Orange County, New York. Orange & Rockland retained Enertech to perform a magnetic field assessment for the existing site and for the original proposed substation configuration. A report was prepared, dated October 6, 2010, and revised on April 16, 2012 which presented the results of this evaluation. Subsequent to this report, Enertech was asked to evaluate the calculated magnetic fields for two alternate substation locations. This report presents the magnetic field assessment for one of the two alternate locations, Alternate Location #1.

Computer models were developed of the proposed alternate 1 substation based upon engineering and design drawings supplied by Orange & Rockland. The Alternate Location #1 is repositioned from the original location southwest near the property line, and rotated 90-degrees clockwise. The existing tower within the property line (supporting 69 kV Lines 24 and 25) will be replaced with three new towers to tap Line 24 into the substation and return new Line 241 back to the existing right-of-way. Two new towers will be installed between the right-of-way and substation to direct Line 24 into the substation and Line 241 back to the existing right-of-way.

Computer modeling results indicate that the calculated magnetic field is primarily associated with the overhead transmission and the underground distribution lines and not the substation components. Along the proposed substation property line, calculated magnetic field levels range from about 0.0 mG to 30.6 mG for a proposed 2012 Peak loading scenario. Directly under the overhead transmission (Lines 24 and 25) the magnetic field increases to 30.6 mG. As the profile crosses over the underground distribution lines the magnetic field increases to about 7.5 mG.

Calculated magnetic field levels are based on computer modeling of the proposed overhead power lines and the proposed substation design with loading provided by Orange & Rockland. If the proposed substation designs or loading conditions differ significantly from modeled conditions, then calculated magnetic field levels could differ from those presented in this addendum report.

1.0 INTRODUCTION

Orange & Rockland Utilities, Inc. is proposing to construct a new electric power substation, the "Hartley Substation", which is located outside the town of Goshen, in Orange County, New York. An evaluation of the calculated magnetic fields associated with the operation of the original substation configuration was performed and a report, entitled "MAGNETIC FIELD MODELING ASSESSMENT FOR THE PROPOSED HARTLEY SUBSTATION" was issued on October 6, 2010. In this report, the proposed substation design was for a substation centered on the upper portion of the property between Hartley Road and Cheechunk Road. Subsequent to this report, an evaluation was performed to characterize the calculated magnetic field if the substation was relocated further to the southwest and rotated 90-degrees. The results of this alternate 1 substation configuration assessment are presented in this Alternate 1 Addendum Report.

2.0 ALTERNATE 1 CONFIGURATION

The alternate 1 substation design that was proposed for the Hartley Substation was positioned between Hartley Road and Cheechunk Road near the property line, to the south of the upper section of the property. An existing 69 kV transmission line (Line 24) is tapped and routed overhead into the proposed substation, and a new overhead 69 kV transmission line (Line 241) is routed back onto the existing right-of-way. Three new utility poles would be installed at the tap location to replace an existing transmission tower. Two new steel utility poles would also be installed to route the overhead 69 kV transmission lines (Lines 24 and 241) from the existing right-of-way into the proposed substation.

3.0 DESCRIPTION OF THE COMPUTER MODELING SOFTWARE

A computer model was developed of the proposed Alternate 1 Hartley Substation to calculate magnetic field levels associated with its operation. The software program "EMF Workstation 2011", which is the latest EPRI magnetic field computer modeling program, was used to perform these magnetic field calculations. The EMF Workstation 2011 software can model the magnetic fields in and around transmission and distribution substations. EMF Workstation 2011 can also model substation equipment such as underground cables, power transformers, buswork, circuit breakers, and capacitor banks. The software can produce two-dimensional magnetic field contour maps of the calculation results, as well as calculation values along a predefined route.

4.0 COMPUTER MODELING RESULTS

Based on the Alternate 1 structure drawings provided by Orange & Rockland, a computer model was developed for the proposed alternate 1 configuration. Magnetic field levels were then calculated at a height of 1 meter above ground in accordance with IEEE Standards [1,2]. Figure 1 presents the calculated magnetic field contour map for the alternate 1 substation configuration (using a projected 2012 peak loading scenario). The presence of the new 69 kV transmission lines, underground distribution circuits, substation equipment (transformers, circuit breakers, and capacitor banks) and buswork contribute to the overall magnetic field levels within the proposed substation property. The existing and new overhead transmission lines and distribution lines are the dominant magnetic field sources along the property line of the substation property site. Contour levels are shown in units of mG.

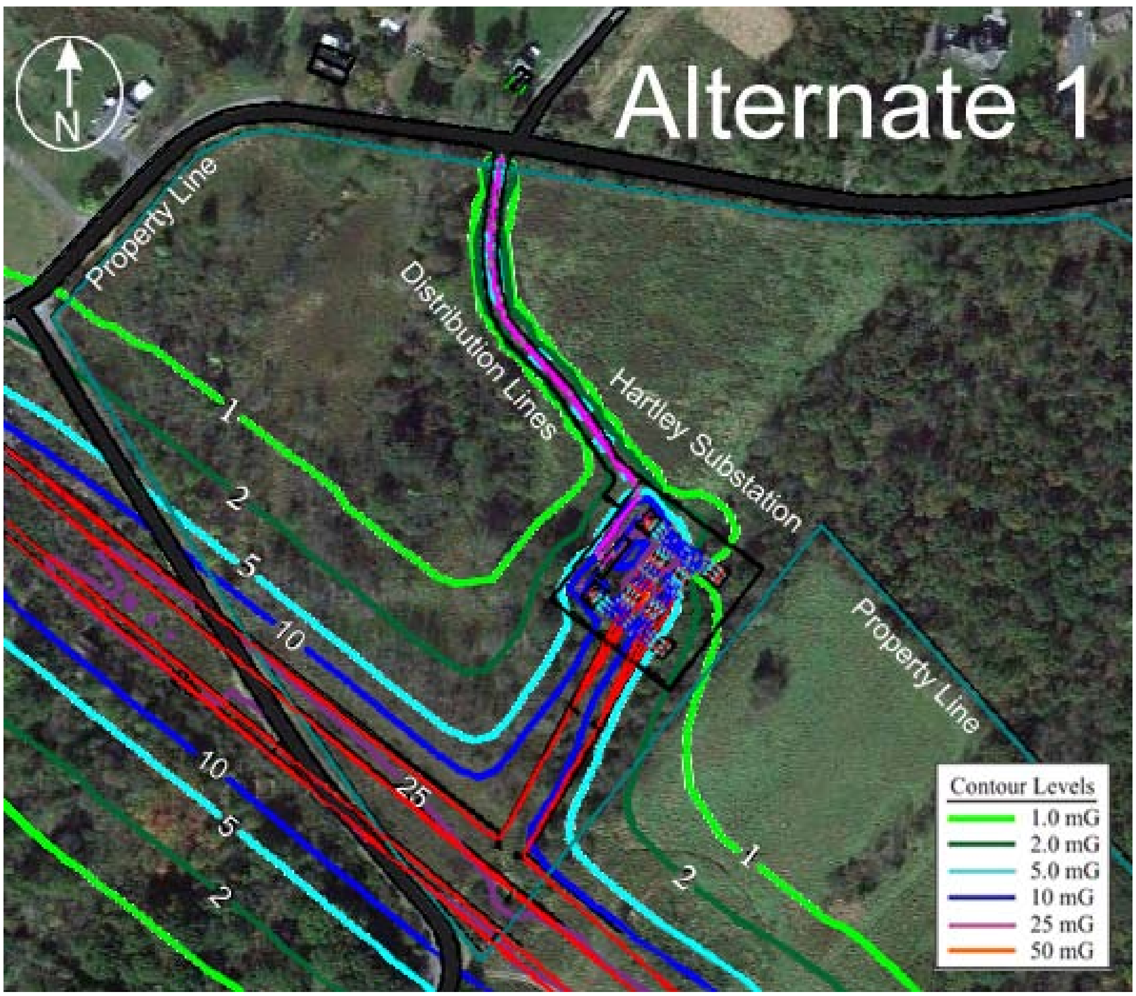


Figure 1. Calculated Magnetic Field Contour Map (in mG) for the Alternate 1 Configuration Under Peak 2012 Loading Conditions

As shown in Figure 1, the calculated magnetic field increases locally near the transmission lines (Lines 24, 25, and 27) and along the tap circuits (Lines 24, and 241). Magnetic fields are also present due to the underground distribution circuits. However, calculated magnetic fields from the underground ducts attenuate much more quickly with distance in comparison to the overhead line configuration. Additional field reduction is achieved from closer underground conductor spacing and magnetic field shielding due to the presence of multi-point grounding of metallic cable sheaths and the resulting eddy current reductions (simulated using a 75% load reduction factor).

Figure 2 is the path that the magnetic field profile takes along the site property line. The Origin starts on the western most corner and proceeds clockwise around the property line including the Conservation Easement.

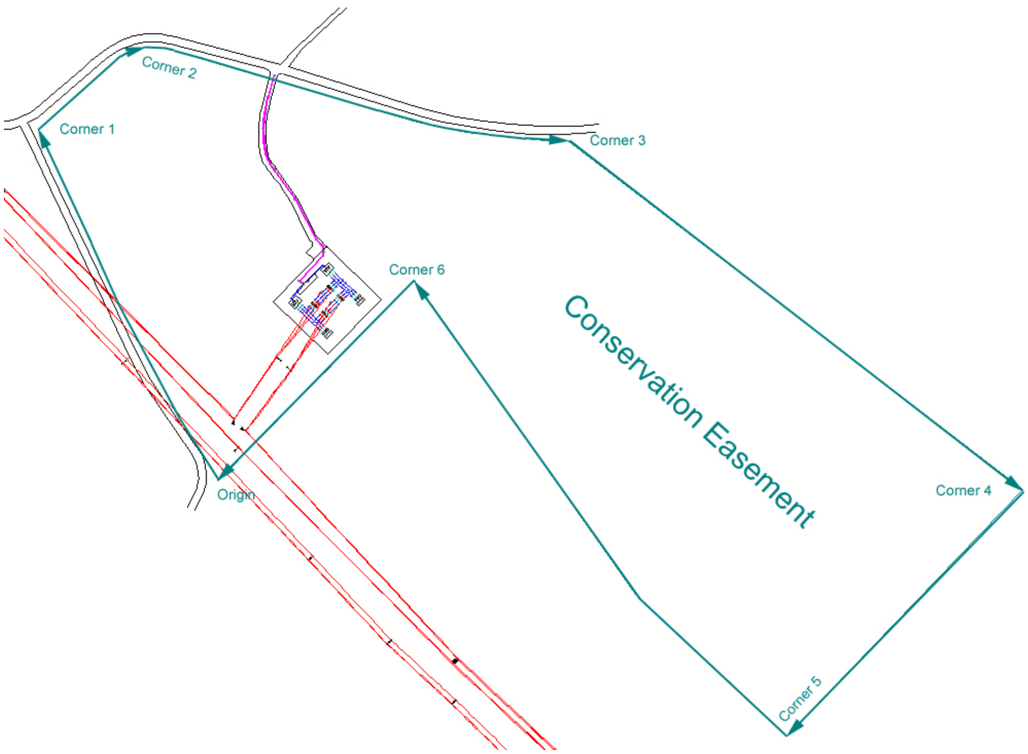


Figure 2. Magnetic Field Profile Path Along the Proposed Substation Property

Figure 3 presents the calculated magnetic field along the proposed substation property line as a magnetic field versus distance graph (for the projected 2012 peak loading scenario). Calculated magnetic field levels along the proposed substation property line range from about 0.0 mG to 30.6 mG (depending upon location along the profile path). Calculated magnetic field levels again increase at locations where the overhead transmission and underground distribution circuits enter and exit the substation property. The location where the highest magnetic field level occurs along the proposed substation property line is along the western portion of the substation property, in the area where the existing overhead 69 kV transmission line circuits (Lines 24 and 25) cross into the substation property.

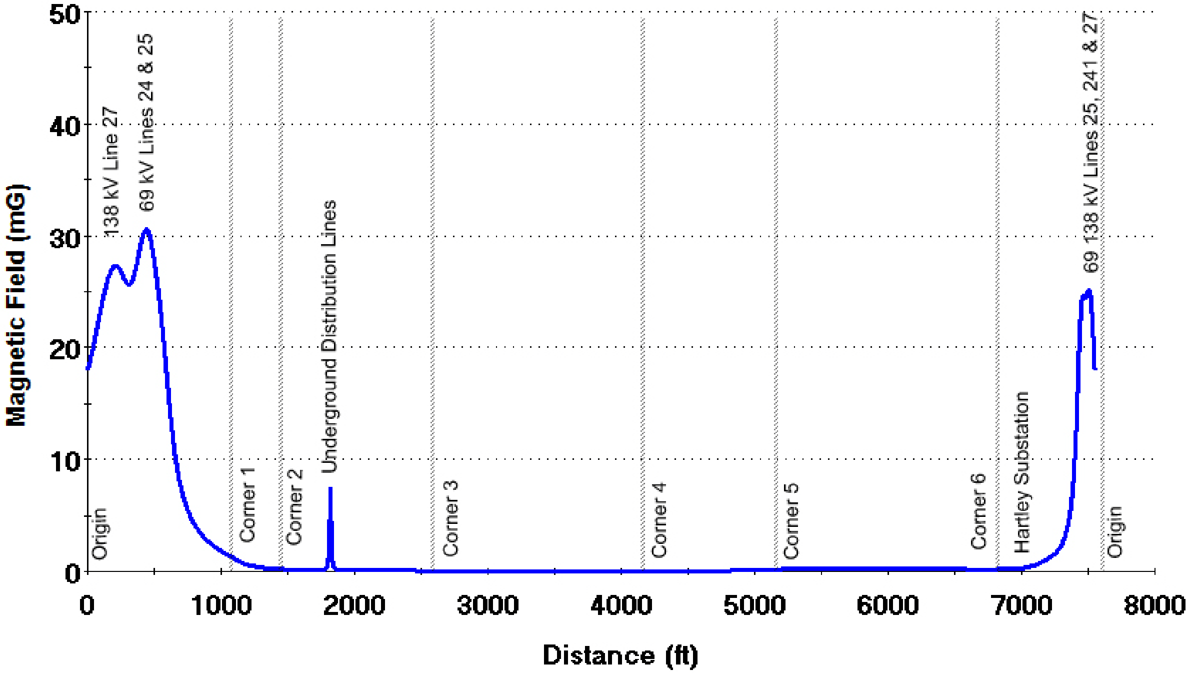


Figure 3. Calculated Magnetic Fields (in mG) Along the Proposed Substation Property Line for the Proposed Alternate 1 Substation Configuration Based on the Peak 2012 Projected Loading Scenario

5.0 DISCUSSION AND COMPARISONS

For the proposed Alternate 1 Hartley Substation configuration, calculated magnetic field levels range from about 0.0 mG to 30.6 mG along the proposed substation property line (for a 2012 peak loading scenario). The location where the highest magnetic field level is calculated occurs along the proposed western substation property line where the existing overhead 69 kV transmission line circuits (Lines 24 and 25) cross into the property. The magnetic field increases to 30.6 mG under the overhead transmission lines and decreases to 0.0 mG as the profile moves away from the transmission lines. As the profile crosses over the underground distribution lines the magnetic field increases to about 7.5 mG.

Calculated magnetic field levels are based on computer modeling of proposed substation design and loading as provided by Orange & Rockland. If the proposed substation design or loading conditions differ significantly from modeled conditions, then calculated magnetic field levels could differ from those presented in this addendum report.

6.0 REFERENCES

1. "IEEE Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines", IEEE Standard 644-1994, Institute of Electrical and Electronics Engineers, 1994.

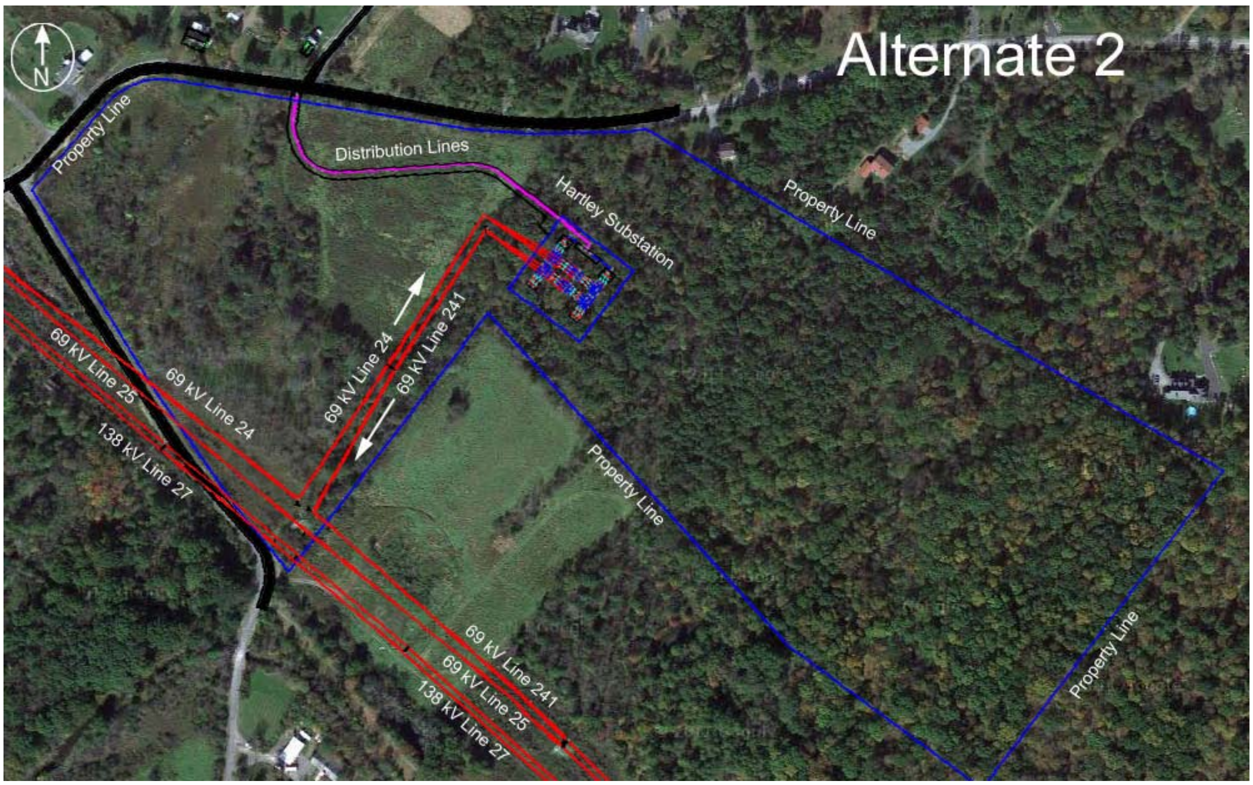
2. "IEEE Guide for the Measurement of Quasi-Static Magnetic and Electric Fields", IEEE Standard 1460-1996, Institute of Electrical and Electronics Engineers, December 1996.

ALTERNATE 2 ADDENDUM REPORT

ADDITIONAL MAGNETIC FIELD MODELING ASSESSMENT

FOR THE

PROPOSED HARTLEY SUBSTATION



Prepared for
Orange & Rockland Utilities, Inc.
390 Route 59
Spring Valley, NY 10977

Prepared by
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494 Salmar Avenue, Suite #200
Campbell, California 95008

April 18, 2012

NOTICE

Prepared by
Enertech Consultants of Santa Clara, Inc.
Campbell, California

EXECUTIVE SUMMARY

Orange & Rockland Utilities, Inc. is proposing to construct a new electric power substation, the "Hartley Substation", which is located outside the town of Goshen, in Orange County, New York. Orange & Rockland retained Enertech to perform a magnetic field assessment for the existing site and for the original proposed substation configuration. A report was prepared, dated October 6, 2010, and revised on April 16, 2012, which presented the results of this evaluation. Subsequent to this report, Enertech was asked to evaluate the calculated magnetic fields for two alternate substation locations. This report presents the magnetic field assessment for one of the two alternative locations, Alternative Location #2.

Computer models were developed of the proposed alternate 2 substation based upon engineering and design drawings supplied by Orange & Rockland. The Alternative Location #2 was repositioned from the original location southeast into the conservation easement. The existing tower within the property line (supporting 69 kV Lines 24 and 25) will be replaced with three new towers to tap Line 24 into the substation and return new Line 241 back to the existing right-of-way. One double circuit steel pole and two single circuit steel poles will be installed between the right-of-way and substation to direct the Line 24 tap and Line 241 back to the existing right-of-way.

Computer modeling results indicate that the calculated magnetic field is primarily associated with the overhead transmission and the underground distribution lines and not the substation components. Along the proposed substation property line, calculated magnetic field levels range from about 0.0 mG to 30.6 mG for a proposed 2012 Peak loading scenario. As the profile crosses over the underground distribution lines the magnetic field increases to about 7.5 mG directly over the distribution lines. The magnetic field also increased to about 1.2 mG as the profile passes near the transmission line tap (Lines 24 & 241) between corner 6 and the profile origin.

Calculated magnetic field levels are based on computer modeling of the proposed overhead power lines and the proposed substation design with loading provided by Orange & Rockland. If the proposed substation designs or loading conditions differ significantly from modeled conditions, then calculated magnetic field levels could differ from those presented in this addendum report.

1.0 INTRODUCTION

Orange & Rockland Utilities, Inc. is proposing to construct a new electric power substation, the "Hartley Substation", which is located outside the town of Goshen, in Orange County, New York. An evaluation of the calculated magnetic fields associated with the operation of the original substation configuration was performed and a report, entitled "MAGNETIC FIELD MODELING ASSESSMENT FOR THE PROPOSED HARTLEY SUBSTATION" was issued on October 6, 2010. In this report, the proposed substation design was for a substation centered on the upper portion of the property between Hartley Road and Cheechunk Road. Subsequent to this report, an evaluation was performed to characterize the calculated magnetic field if the substation was relocated further to the southeast into the conservation easement. The results of this alternate 2 substation configuration assessment are presented in this Alternate 2 Addendum Report.

2.0 ALTERNATE 2 CONFIGURATION

The alternate 2 substation design that was proposed for the Hartley Substation was positioned between Hartley Road and Cheechunk Road into the conservation easement section of the property. An existing 69 kV transmission line (Line 24) is tapped and routed overhead into the proposed substation, and a new overhead 69 kV transmission line (Line 241) is routed back onto the existing right-of-way. Three new utility poles would be installed at the tap location to replace an existing transmission tower. One new double circuit steel utility pole and two new single circuit steel utility poles would also be installed to route the overhead 69 kV transmission lines (Lines 24 and 241) from the existing right-of-way into the proposed substation.

3.0 DESCRIPTION OF THE COMPUTER MODELING SOFTWARE

A computer model was developed of the proposed Alternate 2 Hartley Substation to calculate magnetic field levels associated with its operation. The software program "EMF Workstation 2011", which is the latest EPRI magnetic field computer modeling program, was used to perform these magnetic field calculations. The EMF Workstation 2011 software can model the magnetic fields in and around transmission and distribution substations. EMF Workstation 2011 can also model substation equipment such as underground cables, power transformers, buswork, circuit breakers, and capacitor banks. The software can produce two-dimensional magnetic field contour maps of the calculation results, as well as calculation values along a predefined route.

4.0 COMPUTER MODELING RESULTS

Based on the Alternate 2 structure drawings provided by Orange & Rockland, a computer model was developed for the proposed alternate 2 configuration. Magnetic field levels were then calculated at a height of 1 meter above ground in accordance with IEEE Standards [1,2]. Figure 1 presents the calculated magnetic field contour map for the alternate 2 substation configuration (using a projected 2012 peak loading scenario). The presence of the new 69 kV transmission lines, underground distribution circuits, substation equipment (transformers, circuit breakers, and capacitor banks) and buswork contribute to the overall magnetic field levels within the proposed substation property. The existing and new overhead transmission lines and distribution lines are the dominant magnetic field sources along the property line of the substation property site. Contour levels are shown in units of mG.

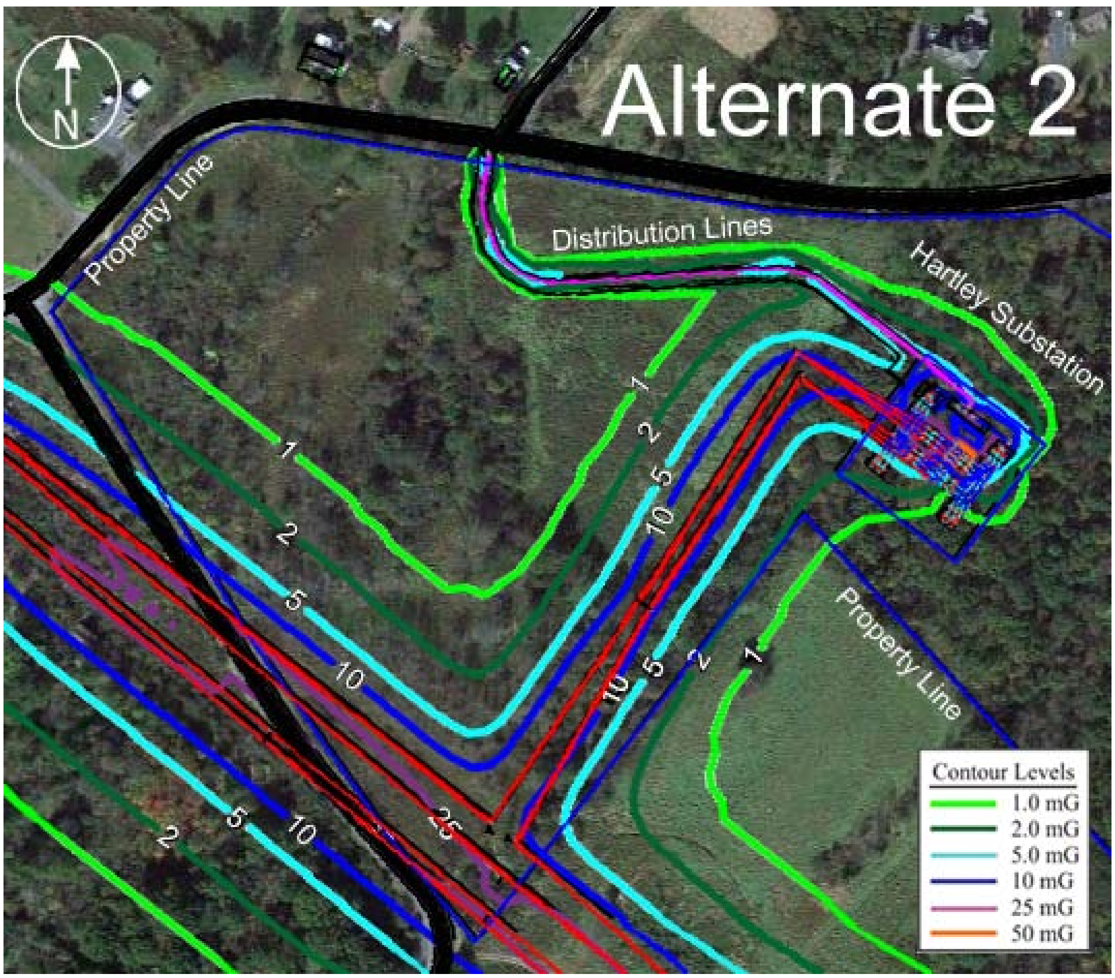


Figure 1. Calculated Magnetic Field Contour Map (in mG) for the Alternate 2 Configuration Under Peak 2012 Loading Conditions (in mG)

As shown in Figure 1, the calculated magnetic field increases locally near the transmission lines (Lines 24, 25, and 27) and along the tap circuits (Lines 24, and 241). Magnetic fields are also present due to the underground distribution circuits. However, calculated magnetic fields from the underground ducts attenuate much more quickly with distance in comparison to the overhead line configuration. Additional field reduction is achieved from closer underground conductor spacing and magnetic field shielding due to the presence of multi-point grounding of metallic cable sheaths and the resulting eddy current reductions (simulated using a 75% load reduction factor).

Figure 2 is the path that the magnetic field profile takes along the site property line. The Origin starts on the western most corner and proceeds clockwise around the property line including the Conservation Easement.

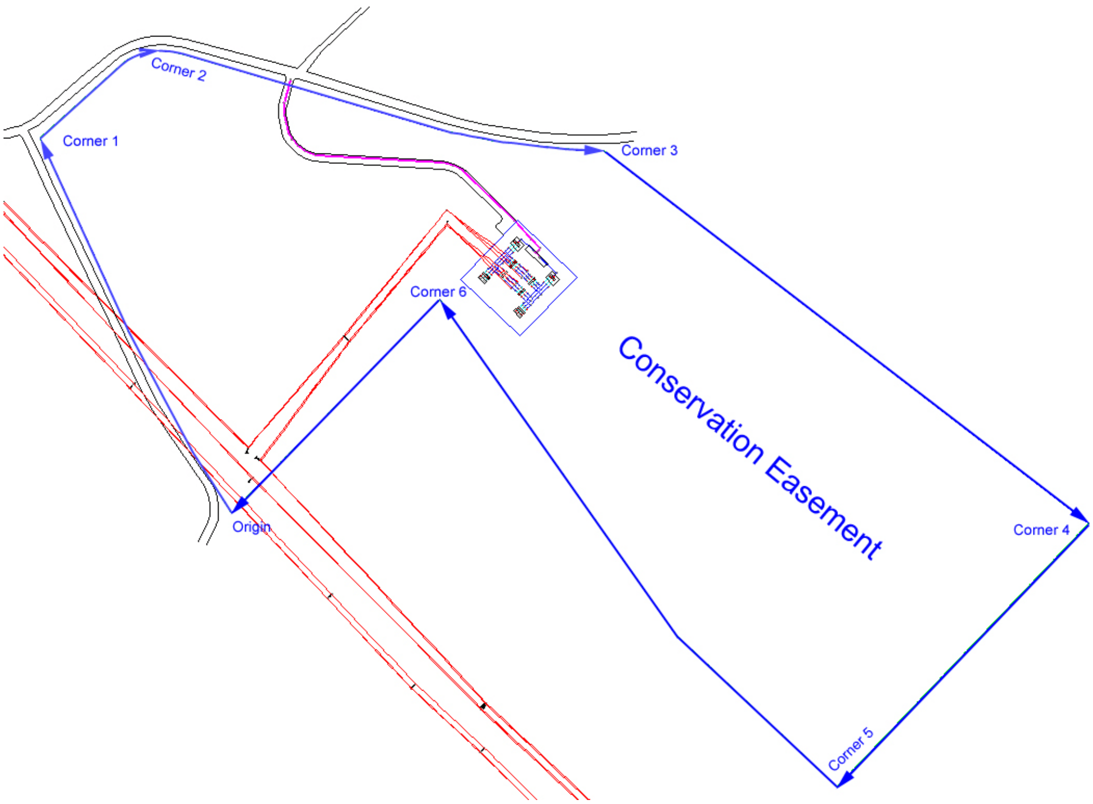


Figure 2. Magnetic Field Profile Path Along the Proposed Substation Property

Figure 3 presents the calculated magnetic field along the proposed substation property line as a magnetic field versus distance graph (for the projected 2012 peak loading scenario). Calculated magnetic field levels along the proposed substation property line range from about 0.0 mG to 30.6 mG (depending upon location along the profile path). Calculated magnetic field levels again increase at locations where the overhead transmission and underground distribution circuits enter and exit the substation property. The location where the highest magnetic field level occurs along the proposed substation property line is along the western portion of the substation property, in the area where the existing overhead 69 kV transmission line circuits (Lines 24 and 25) cross into the substation property.

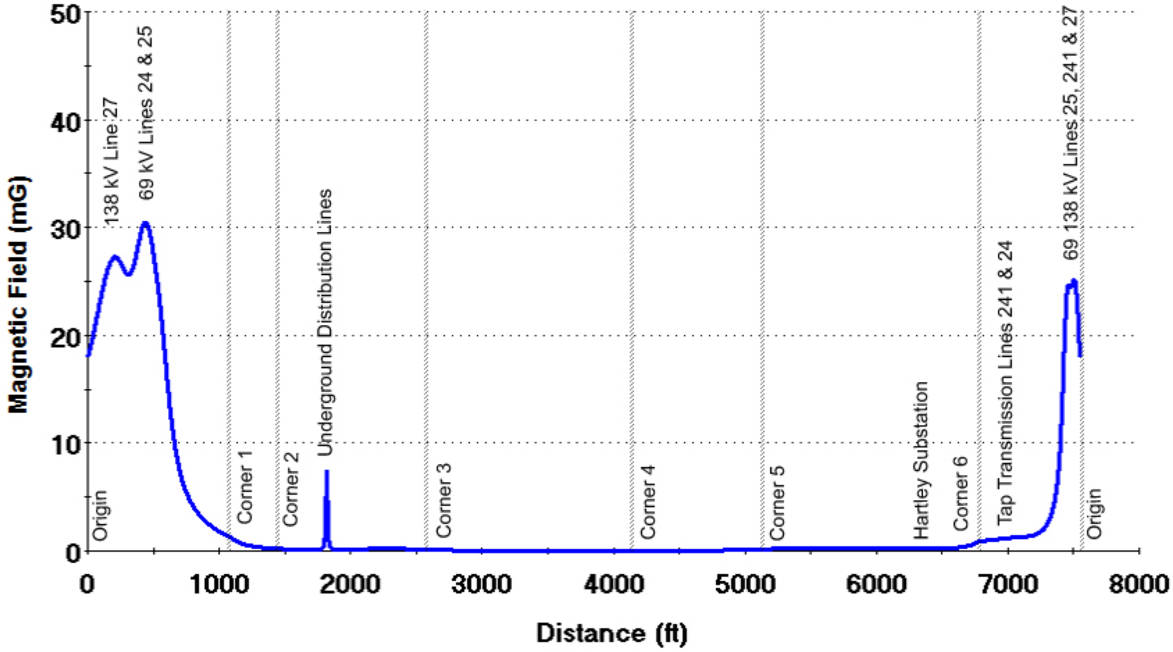


Figure 3. Calculated Magnetic Fields (in mG) Along the Proposed Substation Property Line for the Proposed Alternate 2 Substation Configuration Based on the Peak 2012 Projected Loading Scenario

5.0 DISCUSSION AND COMPARISONS

For the proposed Alternate 2 Hartley Substation configuration, calculated magnetic field levels range from about 0.0 mG to 30.6 mG along the proposed substation property line (for a 2012 peak loading scenario). The location where the highest magnetic field level is calculated occurs along the proposed western substation property line where the existing overhead 69 kV transmission line circuits (Lines 24 and 25) cross into the property. The magnetic field increases to 30.6 mG under the overhead transmission lines and decreases to 0.0 mG as the profile moves away from the transmission lines. As the profile crosses over the underground distribution lines the magnetic field increases to about 7.5 mG. The magnetic field also increased to about 1.2 mG as the profile passes near the transmission line tap (Lines 24 & 241) between corner 6 and the profile origin.

Calculated magnetic field levels are based on computer modeling of proposed substation design and loading as provided by Orange & Rockland. If the proposed substation design or loading conditions differ significantly from modeled conditions, then calculated magnetic field levels could differ from those presented in this addendum report.

6.0 REFERENCES

1. "IEEE Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines", IEEE Standard 644-1994, Institute of Electrical and Electronics Engineers, 1994.

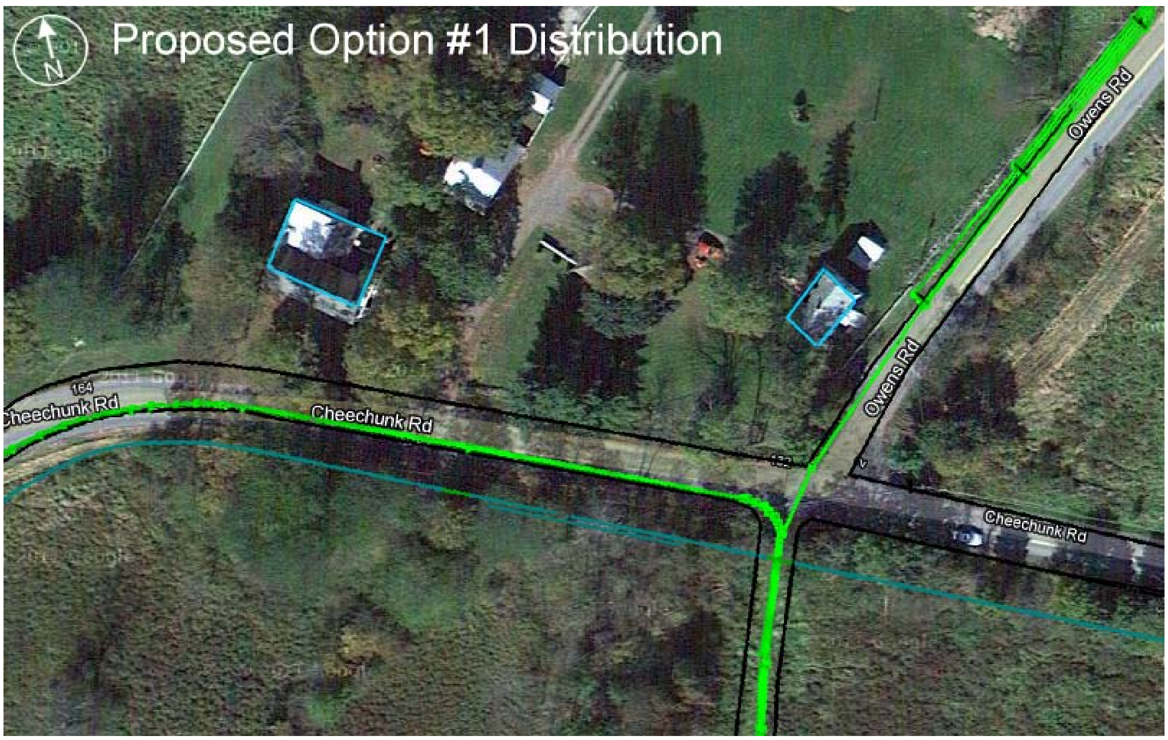
2. "IEEE Guide for the Measurement of Quasi-Static Magnetic and Electric Fields", IEEE Standard 1460-1996, Institute of Electrical and Electronics Engineers, December 1996.

OPTION 1 ADDENDUM REPORT

ADDITIONAL MAGNETIC FIELD MODELING ASSESSMENT

FOR THE

PROPOSED DISTRIBUTION FACILITIES ALONG OWENS AND CHEECHUNK ROADS



Prepared for
Orange & Rockland Utilities, Inc.
390 Route 59
Spring Valley, NY 10977

Prepared by
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April 25, 2012

NOTICE

Prepared by
Enertech Consultants of Santa Clara, Inc.
Campbell, California

EXECUTIVE SUMMARY

Orange & Rockland Utilities, Inc. is proposing to construct a new electric power substation, the "Hartley Substation", which is located outside the town of Goshen, in Orange County, New York. Orange & Rockland retained Enertech to perform a magnetic field assessment for the existing site and for the proposed substation configuration. An addendum report was prepared, dated April 25, 2012, to evaluate the magnetic fields produced from the existing overhead 2.4 kV and the proposed overhead and underground 13.2 kV distribution circuits on Cheechunk Road and Owens Road. Enertech was asked to evaluate the calculated magnetic fields for two optional configurations. This report presents the magnetic field assessment for one of the two optional configurations, Option #1.

A computer model was developed for the proposed Option #1 configuration based upon engineering and design drawings supplied by Orange & Rockland of the proposed distribution facilities, routed along Cheechunk Road and Owens Road. The proposed distribution line is a 3-phase 13.2 kV underground and overhead configuration. The underground configuration transitions to overhead at the first two poles on Owens Road; all other circuits are underground within the study area. The proposed overhead distribution configuration on Owens Road is a double circuit 3-phase configuration. The calculated magnetic fields within a grid of the entire study area range from about 0.1 mG to 25.7 mG for the proposed Option #1 configuration. The peak values occur directly under the overhead distribution lines and decrease rapidly with distance away.

Two homes, one on Owens Road, and another on Cheechunk Road, were included in this evaluation. A profile was calculated along the perimeter of each house to characterize the magnetic field (at 1 meter above ground level in accordance with IEEE Standards [1,2]). The calculated minimum and maximum magnetic fields for each profile are presented in Table 1. Field reduction is achieved from closer underground conductor spacing and magnetic field shielding due to the presence of multi-point grounding of metallic cable sheaths and the resulting eddy current reductions (simulated using a 75% load reduction factor).

Table 1. Calculated Magnetic Field Values Along the Perimeter of the Owens Road and Cheechunk Road Homes

Option #1	
Location	**Proposed**
Owens Road	0.4 – 1.1 mG
Cheechunk Road	0.1 – 0.2 mG

Calculated magnetic field levels are based on computer modeling of the proposed overhead and underground designs using loading provided by Orange & Rockland. If the proposed distribution designs or loading conditions differ significantly from modeled conditions, then calculated magnetic field levels could differ from those presented in this addendum.

1.0 INTRODUCTION

Orange & Rockland Utilities, Inc. is proposing to construct a new electric power substation, the "Hartley Substation", which is located outside the town of Goshen, in Orange County, New York. This addendum to the Magnetic Field Management report, entitled "MAGNETIC FIELD MODELING ASSESSMENT FOR THE PROPOSED HARTLEY SUBSTATION" issued on October of 2010 and revised on April 16, 2012, is an evaluation of the proposed Option #1 distribution configuration to the addendum report, entitled "PROPOSED DISTRIBUTION FACILITIES ALONG OWENS AND CHEECHUNK ROADS" dated April 25, 2012, to evaluate the magnetic fields produced from the proposed overhead and underground 13.2 kV distribution circuits along Cheechunk Road and Owens Road.

The proposed distribution circuits would be routed underground from the proposed Hartley Substation along the substation driveway. Two underground circuits will be routed onto Owens Road where, at the first 2 poles, the circuits will then transition from underground to overhead circuits and continue as a double circuit configuration (Figure 1) along Owens Road. Four underground circuits will be routed along Cheechunk Road north.

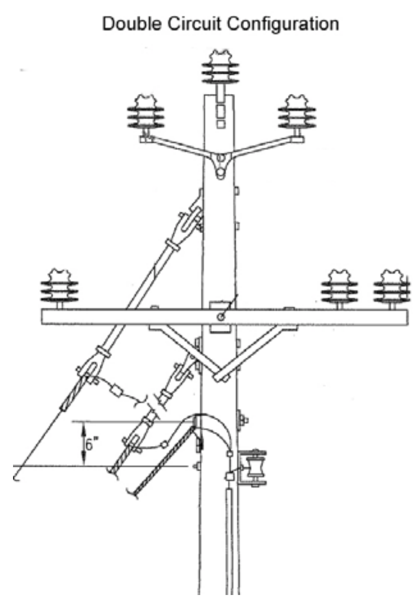


Figure 1. Three Phase Double Circuit Configuration

This Option #1 addendum report describes the magnetic field evaluation which Enertech performed for the proposed underground and overhead distribution configuration as it influences one home on Owens Road and another home on Cheechunk Road (Figure 2).

Figure 2. Home Locations on Owens and Cheechunk Roads in the Study Area

2.0 DESCRIPTION OF THE COMPUTER MODELING SOFTWARE

A computer model was developed of the proposed Option #1 distribution circuits to calculate magnetic field levels associated with its operation. The software program "EMF Workstation 2011", which is the latest EPRI magnetic field computer modeling program, was used to perform these magnetic field calculations. The EMF Workstation 2011 software can model the magnetic fields in and around transmission and distribution substations. The software can produce two-dimensional magnetic field contour maps of the calculation results, as well as calculation values along a predefined route.

3.0 COMPUTER MODELING RESULTS

3.1 MODELING RESULTS FOR THE PROPOSED OPTION #1 CONFIGURATION

A calculated magnetic field contour map is presented in Figure 3 for the proposed Option #1 underground and overhead distribution circuits with a 2012 Peak loading condition (Table 2). The computer model calculated magnetic field levels at a height of 1 meter above ground in accordance with IEEE Standards [1,2]. Magnetic fields calculated within a grid of the proposed study area range from about 0.1 mG to 25.7 mG (Figure 3). Equi-field contour plots are shown in units of mG.

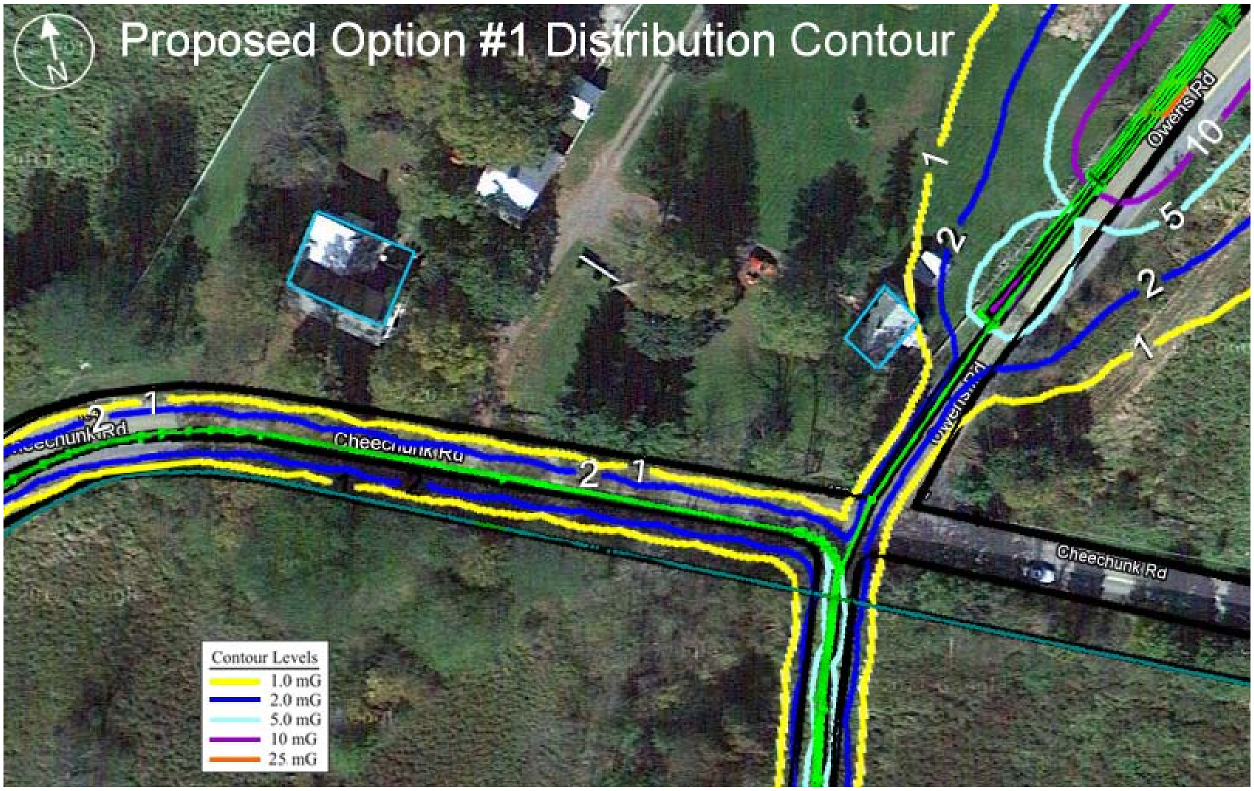


Figure 3. Calculated Magnetic Field Contour Map for the Proposed Option #1 Underground and Overhead Distribution Configuration Under Peak 2012 Loading Conditions (in mG)

Table 2. Proposed Option #1 Underground and Overhead Distribution 2012 Peak Loading

Distribution Circuit	A 0°	B -120°	C 120°
13-2-13	114.3 A	114.3 A	114.3 A
13-3-13	151 A	151 A	151 A
13-4-13	80.9 A	80.9 A	80.9 A
13-7-13	194.3 A	194.3 A	194.3 A
13-8-13	169.8 A	169.8 A	169.8 A
13-9-13	137.2 A	137.2 A	137.2 A

Magnetic field profiles were also calculated for the proposed Option #1 distribution configuration. Figure 4 illustrates the profile route around the perimeter of each home. Figure 5 (Owens House) and Figure 6 (Cheechunk House) are magnetic field versus distance graphs using the 2012 Peak loading scenario. Calculated magnetic field levels range from about 0.4 mG to 1.1 mG for the Owens Road profile, and 0.1 mG to 0.2 mG, along the profile for the home on Cheechunk Road (depending upon location along the profile path). Calculated magnetic field levels increase as the profile nears the distribution line.

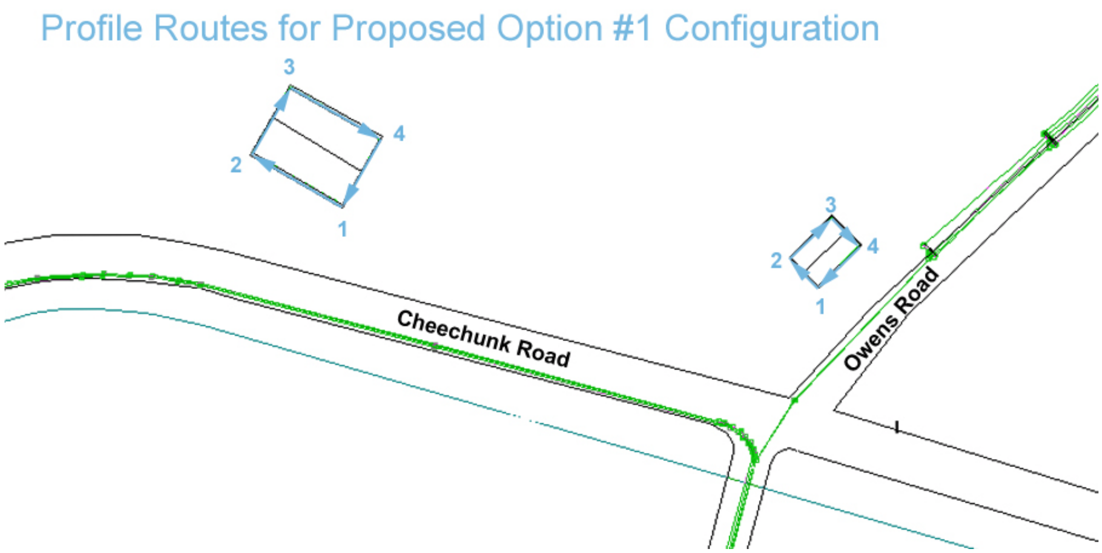


Figure 4. Home Profile Routes for Proposed Option #1 Distribution Configuration

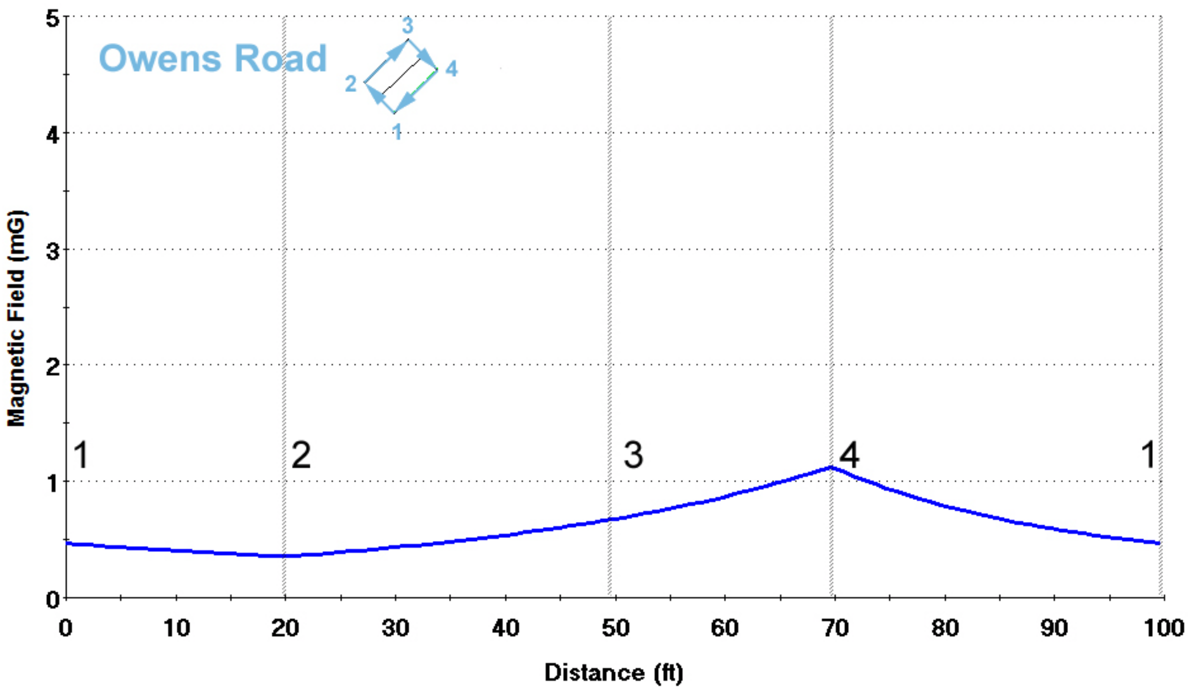


Figure 5. Proposed Option #1 Distribution Configuration: Calculated Magnetic Fields Along the Owens Road Home Profile For a Peak 2012 Loading Scenario (in mG)

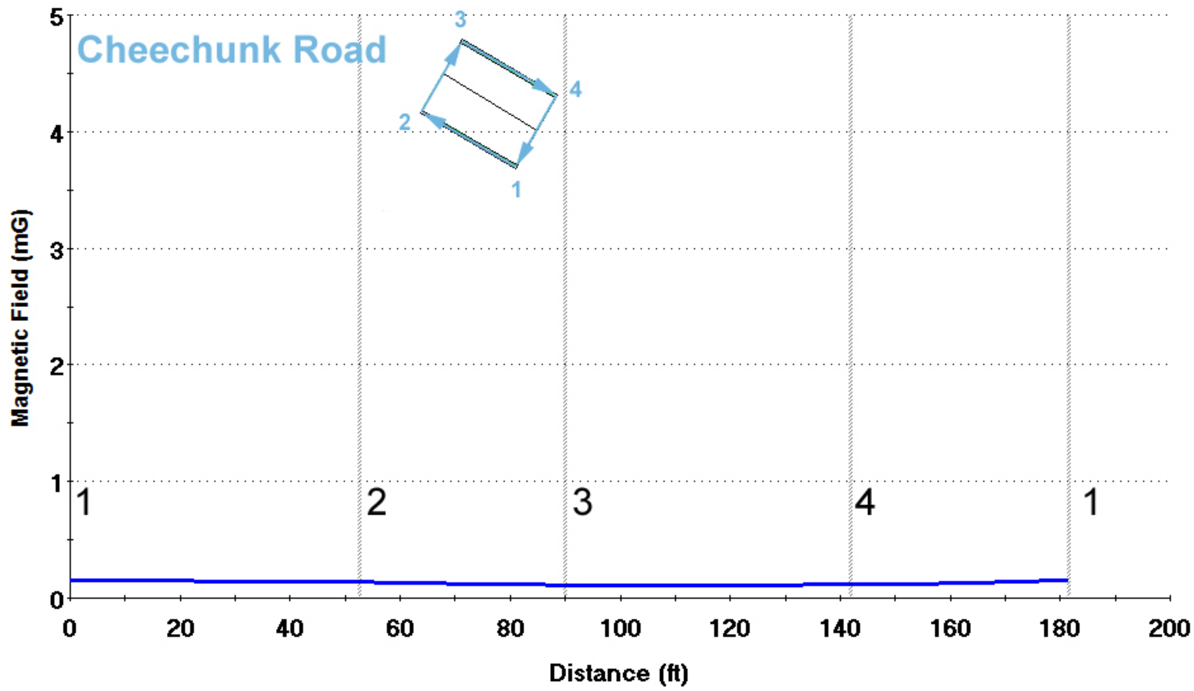


Figure 6. Proposed Option #1 Distribution Configuration: Calculated Magnetic Fields Along the Cheechunk Road Home Profile For a Peak 2012 Loading Scenario (in mG)

6.0 DISCUSSION AND COMPARISONS

A magnetic field contour map was calculated for the Proposed Option #1 distribution line configuration at Cheechunk and Owens Roads. The magnetic field levels for this option range from about 0.1 mG to 25.7 mG for a 2012 peak loading scenario. The maximum levels occur directly underneath the overhead double circuit distribution lines and decrease rapidly with distance away.

Two homes, one on Owens Road, and another on Cheechunk Road, were included in this evaluation. A profile was calculated along the perimeter of each house to characterize the magnetic field levels (at 1 meter height). The calculated minimum and maximum magnetic fields for each profile are presented in Table 4. The maximum magnetic field for the Owens Road house is about 1.1 mG at corner #4. For the Cheechunk Road house, the maximum magnetic field is about 0.2 mG at corner #1. Field reduction, for the underground circuits, is achieved from closer underground conductor spacing and magnetic field shielding due to the presence of multi-point grounding of metallic cable sheaths and the resulting eddy current reductions (simulated using a 75% load reduction factor).

Table 3. Minimum and Maximum Magnetic Field Values for the
Owens Road and Cheechunk Road Homes

Proposed Option # 1	
Location	**Proposed**
Owens Road	0.4 – 1.1 mG
Cheechunk Road	0.1 – 0.2 mG

Calculated magnetic field levels are based on computer modeling of proposed substation design and loading as provided by Orange & Rockland. If the proposed substation design or loading conditions differ significantly from modeled conditions, then calculated magnetic field levels could differ from those presented in this addendum.

7.0 REFERENCES

1. "IEEE Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines", IEEE Standard 644-1994, Institute of Electrical and Electronics Engineers, 1994.

2. "IEEE Guide for the Measurement of Quasi-Static Magnetic and Electric Fields", IEEE Standard 1460-1996, Institute of Electrical and Electronics Engineers, December 1996.

APPENDIX P

Acoustical Impact Report & Addendum

OSTERGAARD ACOUSTICAL ASSOCIATES
200 Executive Drive
W Orange NJ 07052
Voice 973-731-7002
Fax 973-731-6680
acousticalconsultant.com

VIA MAIL & EMAIL ThomasAn@oru.com

13 March 2012

Ms. Anny Thomas
Orange and Rockland
390 W Route 59
Spring Valley, NY 10977

cc: Mr. Thomas Buonincontri, Orange and Rockland BuonincontriT@oru.com
Mr. Diego Morales, P.E., Orange and Rockland MoralesDi@oru.com

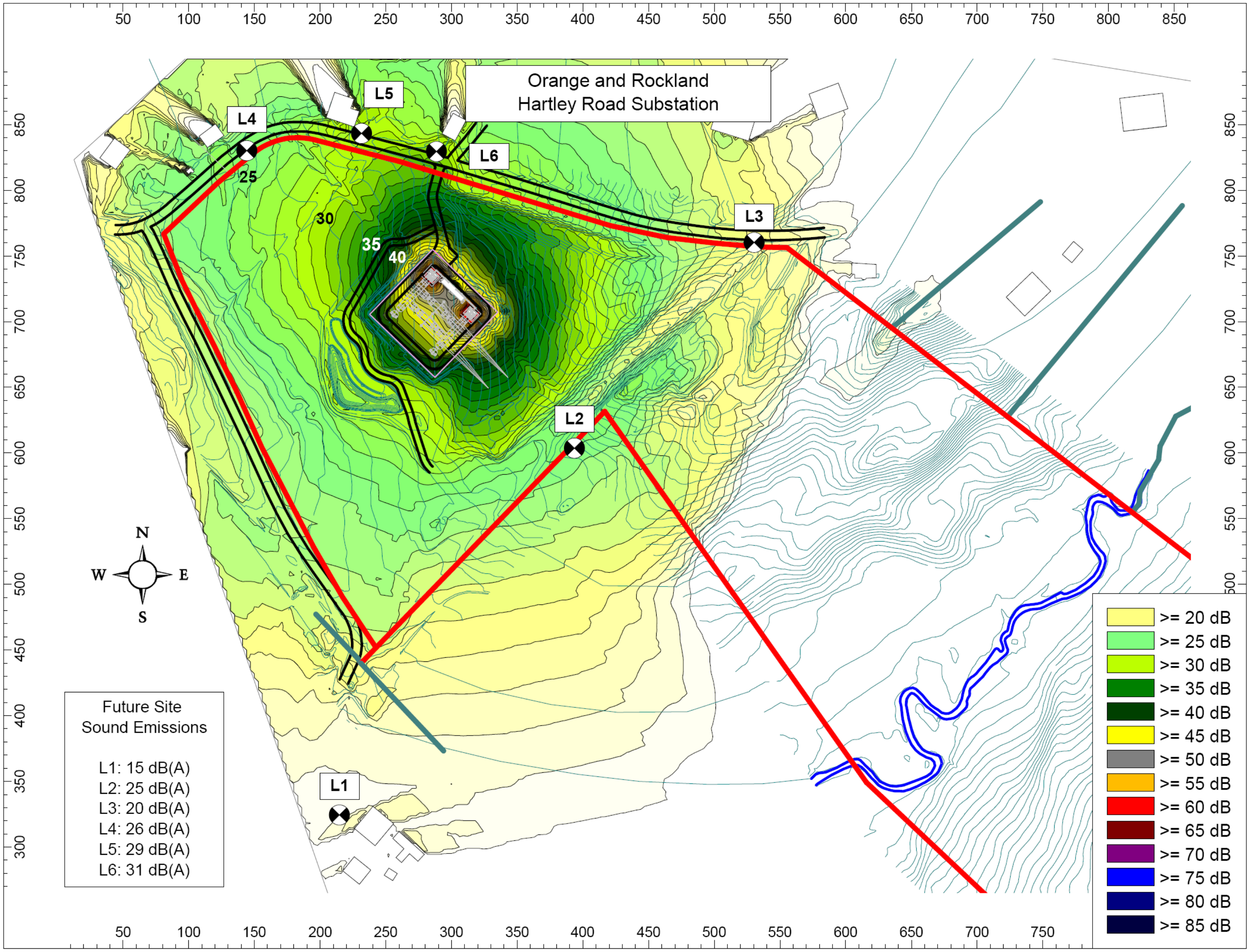
Re: Orange and Rockland Hartley Road Substation
Addendum – Acoustical Impact at 212 Cheechunk Road
OAA File 3621B

Dear Ms. Thomas:

As requested, we have reviewed a 29 January letter of concern prepared by Thornton Soons, LLC, to the Town of Goshen Planning Board, regarding the acoustical impact at the Strong's residence at 212 Cheechunk Road. Several questions were raised regarding the purpose and direction of the study as well as the omission of results at the Strong's property. This letter report should provide clarification and resolve these questions and is an addendum to our 7 October 2011 report. We have the following comments:

1. Because there is nothing currently located at proposed site, the purpose of selecting the monitoring locations was to obtain typical background sound pressure levels in the vicinity of the site. The ambient sound pressure levels in the vicinity of 212 Cheechunk Road are typified by the results at Location 4. Therefore no location was needed specifically at 212 Cheechunk Road for this type of survey. If this was a noise survey of an existing substation, a different study would have been carried out and sound pressure level measurements would have been obtained at the nearest residential receptors, specifically the Strong's tenant home just west of the intersection of Cheechunk Road and Owens Road.

2. The acoustical model of future sound emissions from the proposed substation is shown in Figure 18 of our 7 October 2011 report and referenced in the Thornton Soons letter. The future sound emissions at 212 Cheechunk Road were not omitted and are show as color contour plots. The contours are shown in 1 dB increments and reveal that the maximum sound pressure level at the nearest residential property to the north is 31 dB(A), as mentioned in our report. In order to provide a greater level of detail, the acoustical model has been expanded to show lower limit sound pressure levels and updated to include the most current site plan grading information such as the proposed berm to the northeast and the drainage basin to the southwest. The detailed acoustical model of future sound emissions is shown in Addendum Figure 1. Locations L5 and L6 have been added to represent the Strong Farmhouse and the Strong's tenant house, respectively. The model results confirm that the maximum sound pressure level will be 29 dB(A) at L5 and 31 dB(A) at L6.



Addendum Figure 1 — Worst-case future site sound emissions, Hartley Road Substation, Goshen, NY.

3. It has been established above in Item 1 that Location 4 sound levels most closely typify ambient sound levels in the vicinity of 212 Cheechunk Road. As documented in Figures 8 and 9 in our 7 October 2011 report, ambient sound pressure levels monitored at Location 4 show an average sound pressure level of about 60-to-65 dB(A) during the daytime and 40-to-45 dB(A) during the nighttime. On Sunday June 27th, between 2:00 AM and 3:00 AM, the lowest sound pressure levels were documented. The resulting hourly background sound pressure level for this hour was of 32 dB(A). Comparing the lowest background sound pressure level to the highest future site sound emissions, as done in Table II of the October 2011 report, is the most conservative method of predicting the acoustical impact of the project. An update to Table II to now include Locations 5 and 6, shown in Addendum Figure 1, is provided as follows:

Location	**Minimum Measured Hourly L_{90}**	**Future Transformer Emissions**	**Future L_{90}**	**Difference Between Existing and Future L_{90}**
5	32	29	34	2
6	32	31	35	3

There will be a change in existing sound pressure level at Location 5 of +2 dB and change at Location 6 of +3 dB. This change is minor and is expected to be between "not noticeable" and "just noticeable" to the typical listener at Location 5 and 6. It is therefore concluded that on a quiet night the substation will be just audible at these locations but typically, with the combination of varying ambient sound levels in the area, the site will likely not be noticeable at even the closest receptors. As a result, the acoustical impact of the Hartley Road Substation on the surrounding community will be minimal. This is the same conclusion provided in our 7 October 2011 report.

I trust that the above clarification is helpful to you. If you have any questions please let me know.

Sincerely yours,

OSTERGAARD ACOUSTICAL ASSOCIATES

B. Mueller

Benjamin C. Mueller, P.E.
Principal

BCM:amc

APPENDIX Q

Residential Property Valuation Report and Comment Response Letter

6 Front Street

Newburgh, New York

12550

Tel. 845-568-0600

Fax. 845-568-0699

CONSULTANTS
VALUATION
INCORPORATED

March 2, 2012

Members of the Town Board and Planning Board
Town of Goshen
Goshen, NY 10924

Re: Orange and Rockland Substation
Hartley and Cheechunk Roads

To whom it may concern:

I have reviewed the concerns regarding the analysis our firm completed on property values and proximity to electrical substations. Following are the responses to these concerns:

Scott A. Thornton wrote on behalf of William and Jean Strong of the concern of potential impacts on rental property.

The analysis on value was focused on sales activities because the purchase of homes in this market is typically for owner occupancy rather than income. However, the exhausting thought process involved in the purchase of a property, would at least equal or exceed the thought process involved for a rental, which is typically for temporary housing in the particular neighborhood being considered. The proximity or potential noise considerations of an electrical substation would have the same or less impact upon the rental market than the sales market for real property.

Donna Allen wrote of the dated nature of the data applied in our analysis and proximity of the sales to the electrical facilities. Holly O'Hern, Tom Mullane, Josh Shoen and Nancy Wiegand also expressed concern of their home values.

In our report, we have highlighted several sales of residences near electrical substations and compared them to similar properties that were sold, distant from those facilities. Of course, all of the sales analyzed are historical, including those supplied as comparables. However, any sale that is proximate to an electrical substation, was compared with sales in the same time period but distant from any such facility. The purpose of those comparisons is to examine how the market has reacted in the past, so we can project its reaction currently.

The sales provided in our analysis vary in proximity to the substations they surround. This is due first to a lack of abundance of these facilities, as well as examples of how the market would react to these varying degrees of proximity. However, the plans for this project include existing and proposed natural buffers along Hartley and Cheechunk Roads so as to minimize the views of the substation from those roads. The provision of those buffers is insured as a condition of the approvals for this project.

If there are any further questions or concerns, please contact me. Thank You.

Sincerely,

Thomas McChesney

Thomas M. McChesney, SRA

APPENDIX R
Resumes

APPENDIX S

90-Foot Shift


OWENS ROAD
CHEECHUNK ROAD
HARTLEY ROAD
BENCH MARK
RAILROAD SPIKE FOUND
ELEV. = 408.96
BENCH MARK
RAILROAD SPIKE FOUND IN
POLE L&P 48936/51334
ELEV. = 384.03
WETLANDS
UPLANDS
PROPOSED BIO-RETENTION BASIN
PROPOSED DRY E.D. STORM WATER BASIN
BLOCK RETAINING WALL
FIELD INLET
HEADWALL
F.E.S.
RIP-RAP
UTILITY CORRIDOR
LIMIT OF OWENS ROAD SCENIC ROAD CORRIDOR OVERLAY
TOWER 19
TOWER 20
INV. 12" CMP=397.96
INV. 12" CMP=396.34
INV. 18" HDPE=369.52
INV. 18" HDPE=368.20
INV. 12" CMP=369.70
INV. 12" CMP=369.41
ORANGE AND ROCKLAND UTILITIES, INC.
PEARL RIVER NEW YORK
HARTLEY ROAD SUBSTATION
SUBSTATION SHIFTED 90 FEET
LAYOUT PLAN
ENGINEERING REVIEW
CIVIL/SURVEY
TELECOM/MET.
TRANS & SUB.
RELAY
PERMIT
BID
CONSTRUCTION
RECORD
J.M.
SCALE 1"=50'
STATION NO. 0013
DRAWING NUMBER K F 6499
REV. A

WINTER VIEW 2

Hartley Road Substation – Substation Shifted 90 Ft.
Orange and Rockland Utilities, Inc.
Town of Goshen, Orange County, New York

Image Source: CMX

CMX 1311 Mamaroneck Avenue Suite 50 White Plains New York

WINTER VIEW 5

Hartley Road Substation – Substation Shifted 90 Ft.

Orange and Rockland Utilities, Inc.

Town of Goshen, Orange County, New York

CMX 1311 Mamaroneck Avenue Suite 50 White Plains New York

Image Source: CMX

WINTER VIEW 7

Hartley Road Substation – Substation Shifted 90 Ft.
Orange and Rockland Utilities, Inc.
Town of Goshen, Orange County, New York

Image Source: CMX

CMX 1311 Mamaroneck Avenue Suite 50 White Plains New York