Golden Horseshoe Shopping Center

WESTCHESTER COUNTY, NEW YORK

Final Engineering Report
Sub-Slab Depressurization System

NYSDEC Site Number: V–00309-3

Prepared for:

Scarsdale Shopping Center Associates, LLC

c/o Mr. David A. Roth, Esq.

Metro Corporate Campus One

P.O. Box 5600

Woodbridge, NJ 07095-0988

Prepared by:

TRC Engineers, Inc.

1430 Broadway, 10th Floor

New York, New York 10018

212-221-7822

MARCH 2011

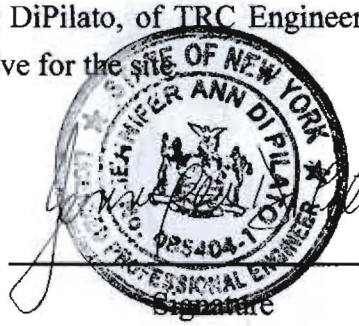
CERTIFICATIONS

I, Jennifer DiPilato, am currently a registered professional engineer licensed by the State of New York, I had primary direct responsibility for implementation of the Engineering Control program activities, and I certify that the Engineering Control design was implemented and that all construction activities were completed in substantial conformance with the Department-approved Engineering Control design.

I certify that the data submitted to the Department with this Final Engineering Report demonstrates that the Engineering Control requirements set forth in the Engineering Control design and in all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established for the control.

I certify that a Site Management Plan has been submitted for the continual and proper operation, maintenance, and monitoring of the Engineering Control employed at the Site and that such plan has been approved by Department.

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Jennifer DiPilato, of TRC Engineers, Inc., am certifying as Owner's Designated Site Representative for the site.



085404	3/22/11	
NYS Professional Engineer #	Date	Signature

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LIST OF ACRONYMS

Acronym	Definition
EC	Engineering Control
FER	Final Engineering Report
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
RAO	Remedial Action Objective
SSDS	Sub-Slab Depressurization System
VCA	Voluntary Cleanup Agreement
WPAR	Work Plan Addendum Report

FINAL ENGINEERING REPORT

1.0 BACKGROUND AND SITE DESCRIPTION

Scarsdale Shopping Center, LLC, entered into a Voluntary Cleanup Agreement (VCA) with the New York State Department of Environmental Conservation (NYSDEC) in December 2001, to investigate and remediate an 8-acre property, known as the Golden Horseshoe Shopping Center, located in the Towns of New Rochelle and Scarsdale, Westchester County, New York (the "Site"). This Final Engineering Report presents a description of the Engineering Control, a sub slab depressurization system (SSDS), installed in the United States Post Office in the Golden Horseshoe Shopping Center (Shopping Center).

An electronic copy of this Final Engineering Report (FER) with all supporting documentation is included as Appendix A.

1.1 SITE DESCRIPTION

The Site is located in the Towns of New Rochelle and Scarsdale and County of Westchester, New York and is identified as Block 1 and Lot 502 for the Scarsdale Section and Block 3440 and Lot 001 for the New Rochelle Section on the Scarsdale and New Rochelle Tax Maps, respectively. The Site is approximately 8-acres in area and is bound by residential properties to the north and west, Wilmot Road to the south and Heathcote Road to the east (see Figure 1). The Site is occupied by the Golden Horseshoe Shopping Center, a single story shopping center that consists of the original building (built c. 1957) and three additions (built c. 1963, 1984 and 1989).

1.2 SITE HISTORY

A dry cleaner occupied a store in the 1984 addition of the Shopping Center from 1984 to 1997. A prior investigation identified levels of chlorinated solvents in soil and groundwater. Remediation of soil and groundwater was performed in accordance with the Remedial Action Work Plan for the Site, dated December 2, 2001. Following remediation, investigations showed remediation of soil and groundwater had been completed to the satisfaction of the NYSDEC. The NYSDEC issued a no further action letter for soil and groundwater dated September 25, 2006. A copy of this letter is provided in Appendix B.

Currently, the United States Postal Service (USPS) occupies the former dry cleaner space. Other occupants of the Site near the USPS include a nail salon and a different dry cleaner. The locations relative to the USPS are shown on Figure 2.

As described in the Work Plan Addendum Report (WAPR), dated February 6, 2007, which was approved by the NYSDEC in a letter dated March 12, 2007 (see Appendix B), sub-slab vapor and indoor air sampling were conducted in March 2006 and January 2007. Comparing the results of the sampling to the sub-slab vapor and indoor air matrices in the New York State Department of Health (NYSDOH) document titled *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* dated October 2006, mitigation was recommended for the 1963 and 1984 additions. As a result, an SSDS was installed in the 1963 and 1984 additions. This FER discusses the details of design, installation and operation of the SSDS.

2.0 SUMMARY OF ENGINEERING CONTROL

2.1 OBJECTIVE

Since sampling performed in March 2006 and January 2007 detected volatile organic compounds in sub-slab vapor beneath the Shopping Center building, an Engineering Control (EC) was recommended by NYSDOH. An SSDS was installed as the primary Engineering Control. The intent of the SSDS is to create a negative pressure (vacuum) below the floor slabs of the 1963 and 1984 additions relative to the indoor air, minimizing the potential for soil vapor intrusion.

2.2 DESCRIPTION OF SELECTED ENGINEERING CONTROL

Mitigation activities completed at the Site were conducted in accordance with the Sub-Slab Depressurization System Design and Site Management Plan dated November 29, 2007 and Addendum No. 1 to the Sub-Slab Depressurization System Design and Site Management Plan dated April 15, 2008. These documents were approved by the NYSDEC in a letter received on March 14, 2008 and a letter dated June 18, 2008, respectively.

The SSDS design was prepared in accordance with the NYSDOH document titled *Guidance for Evaluating Soil Vapor Intrusion in the State of New York*, October 2006. Installation of the SSDS was completed in May 2009.

Consistent with the overall objective of the SSDS to mitigate the potential for soil vapor intrusion into the 1963 and 1984 additions of the Golden Horseshoe Shopping Center, two sub-slab depressurization pits were installed in the Post Office. Seven monitoring points were installed through the floor slabs in the Post Office, restaurant, hair salon and dry cleaner. Each sub-slab depressurization pit is connected via 6-inch diameter piping below the floor slab to a 6-inch diameter riser that extends through the building roof. On the building roof, each riser is connected to a suction fan, which applies a vacuum to the sub-slab depressurization pits and depressurizes the space below the building floor slab. Refer to Figure 3 for the approximate locations of the sub-slab depressurization pits, vertical risers and monitoring points.

Following system startup, the pressure differential between indoor air and the sub-slab vapor was measured at each monitoring point and the results indicate that vacuum is present below the slab of the 1963 and 1984 additions of the Golden Horseshoe Shopping Center. A summary of the findings is provided in Table 1 below.

Table 1: Sub-Slab Vacuum at Monitoring Points	
Monitoring Point Identification Number	Vacuum (Inches of Water Column)
MP-1	0.105
MP-2	0.18
MP-3	0.055
MP-4	0.1
MP-5	0.01
MP-6	0.015
MP-7	0.015

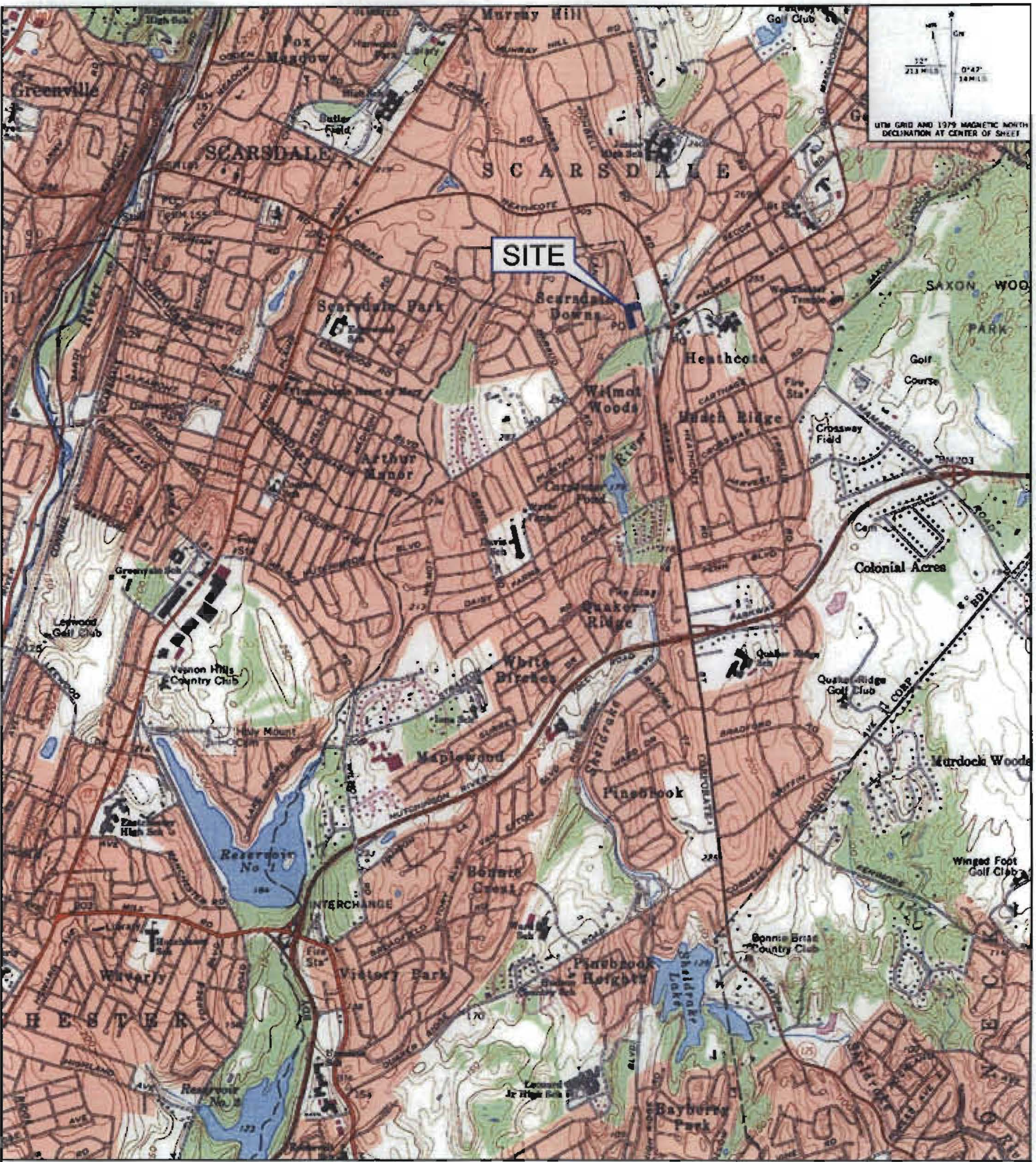
The SSDS is designed to operate continuously. Installed near the inlet of each suction fan is a flow switch that would activate a visual alarm within the USPS in the event of low flow. Manufacturer documentation on the suction fan and flow switch are provided in Appendix C.

Procedures for monitoring, operating and maintaining the SSDS system are provided in the Site Management Plan (SMP). The SMP also addresses inspection procedures to be implemented in the event that a warning device indicates the system is not working properly, the system becomes damaged, or if the heating, ventilation and air conditioning (HVAC) systems undergo modifications that may reduce the effectiveness of the system. The SMP was submitted to the NYSDEC on November 29, 2007 as an attachment to the letter report titled *Sub-Slab Depressurization System Design and Site Management Plan.*

LIST OF FIGURES

1. Site Location Map
2. Site Map
3. Sub-Slab Depressurization System As-Built Plan
4. Sub-Slab Depressurization System As-Built Details

FIGURES



SCALE 1:24000

1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETER

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER

NEW YORK

QUADRANGLE LOCATION

MOUNT VERNON, N. Y.
NE/4 HARLEM 15' QUADRANGLE
N4052.5—W7345/7.5
1966
PHOTOREVISED 1979
AMS 6265 IV NE—SERIES V821

MAP OBTAINED THROUGH USE OF MAPTECH TERRAIN NAVIGATOR PRO SOFTWARE.

TRC
1430 BROADWAY, 10TH FLOOR
NEW YORK, NEW YORK 10018
212-221-7822

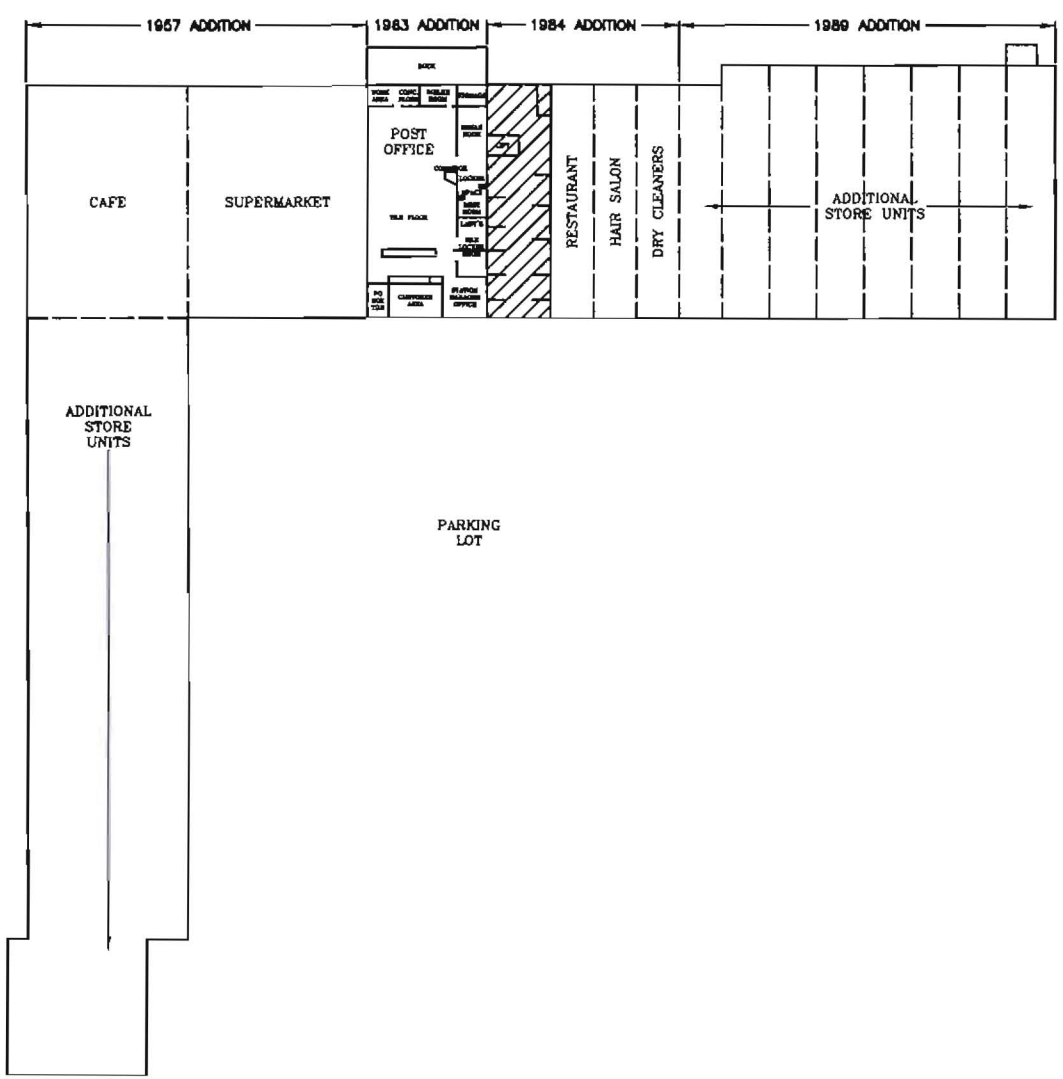
DESIGNED BY:	JD
DRAWN BY:	HD
CHECKED BY:	DSG
DATE:	MARCH 2011
SCALE:	AS SHOWN
PROJECT NUMBER:	150515.0000.0000

PROJECT NAME:
FINAL ENGINEERING REPORT
GOLDEN HORSESHOE SHOPPING CENTER
SCARSDALE, NEW YORK 10583

DRAWING TITLE
SITE LOCATION MAP

FIGURE
1

Path\Name: I:\Projects\...\Golden HShoe 5505\FEX\Figures\Figure 1 - Site Location Map.dwg - Date\Time: Thu, 03 Mar 2011 - 2:44pm - ...name: lndelgado - Layout Tab: 8.5X11



LEGEND

STORE BOUNDARY

AREA OF POST OFFICE FORMERLY OCCUPIED BY DRY CLEANER

1989 — APPROXIMATE DATE OF CONSTRUCTION

NOTE:
BUILDING AND SITE BOUNDARIES ARE APPROXIMATE.

0 50 100 FT.

SCALE: 1"=50'

PAPER SIZE: 8½" x 11"

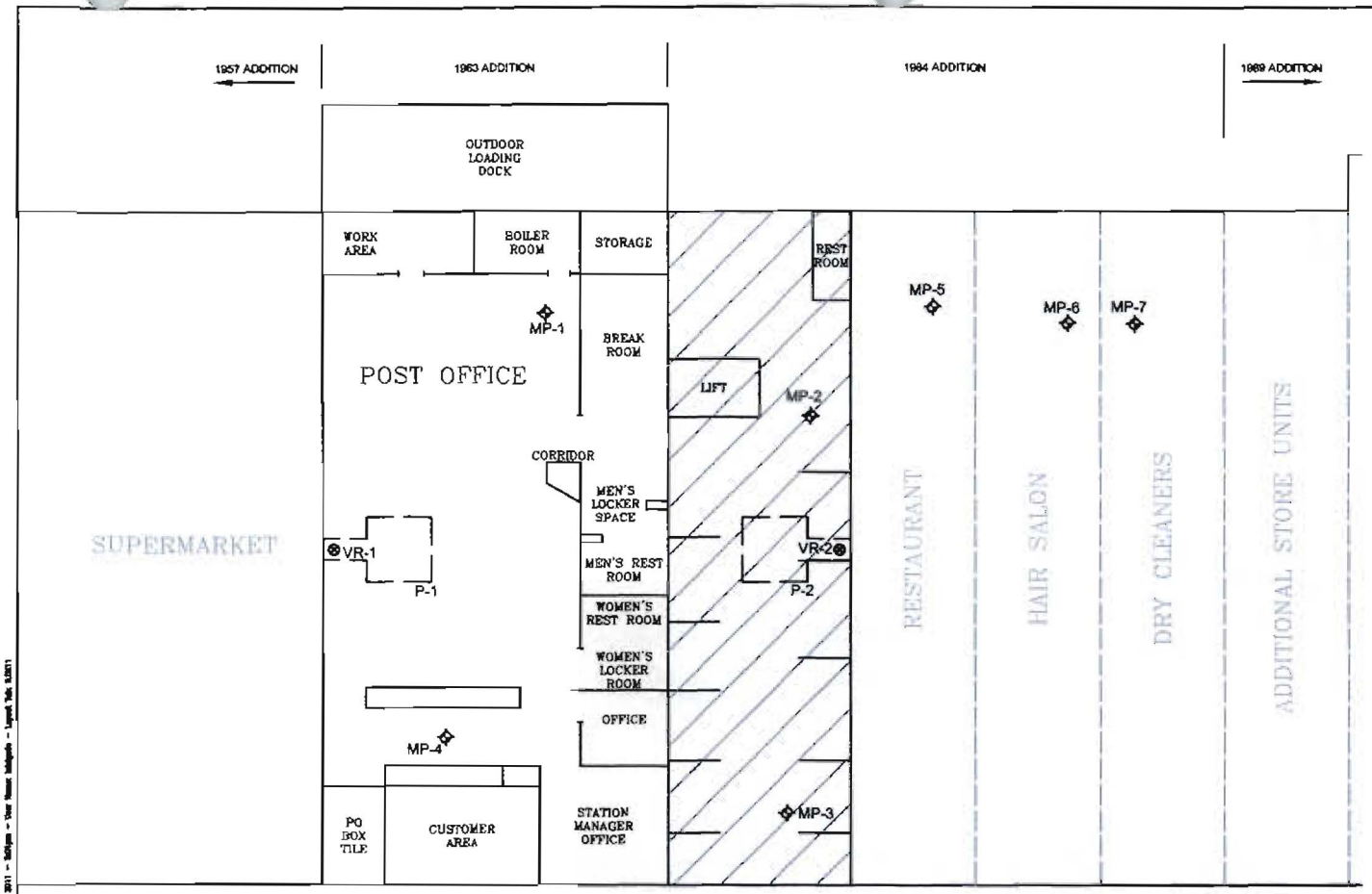
TRC
1430 BROADWAY, 10TH FLOOR
NEW YORK, NEW YORK 10018
212-221-7822

DESIGNED BY: JD	
DRAWN BY: HD	
CHECKED BY: DSG	
DATE: MARCH 2011	
SCALE: AS SHOWN	
PROJECT NUMBER: 150515.0000.0000	

PROJECT NAME:
FINAL ENGINEERING REPORT
GOLDEN HORSESHOE SHOPPING CENTER
SCARSDALE, NEW YORK 10583

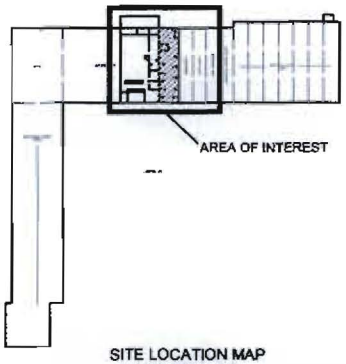
DRAWING TITLE:
SITE MAP

FIGURE
2



LEGEND (SYMBOLS NOT TO SCALE)

- POST OFFICE BOUNDARY
- MP-1 — APPROXIMATE SUB-SLAB MONITORING POINT LOCATION AND IDENTIFICATION NUMBER
- VR-1 — APPROXIMATE RISER LOCATION AND IDENTIFICATION NUMBER. EXTENDS THROUGH ROOF TO SUCTION FAN
- P-1 — APPROXIMATE SUB-SLAB DEPRESSURIZATION SYSTEM PIT LOCATION AND IDENTIFICATION NUMBER (BENEATH FLOOR SLAB)
- AREA OF POST OFFICE FORMERLY OCCUPIED BY DRY CLEANER



SITE LOCATION MAP
NOT TO SCALE

SEAL

JENNIFER ANN DI PILATO, PE
NY PE # 085404-1
DATE: MARCH 22, 2011

NOTE:
BUILDING AND SITE BOUNDARIES ARE APPROXIMATE.

0 16 32 FT.
SCALE: 1"=16'
PAPER SIZE: 8½" x 11"

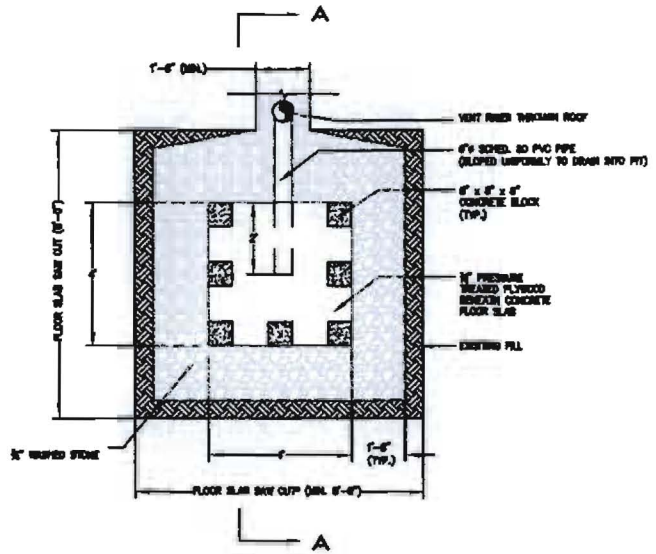
TRC
1430 BROADWAY, 10TH FLOOR
NEW YORK, NEW YORK 10018
212-221-7822

DESIGNED BY: JD	
DRAWN BY: HD	
CHECKED BY: DSG	
DATE: MARCH 2011	
SCALE: AS SHOWN	
PROJECT NUMBER: 150515.0000.0000	

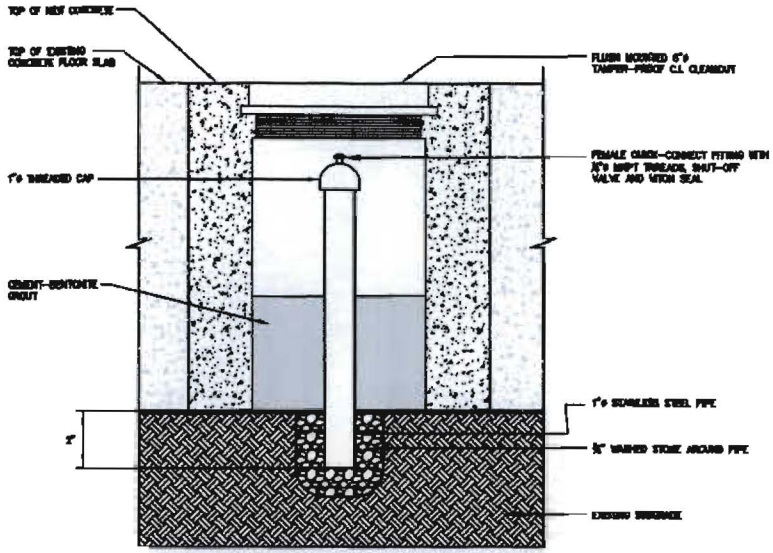
PROJECT NAME:
FINAL ENGINEERING REPORT
GOLDEN HORSESHOE SHOPPING CENTER
SCARSDALE, NEW YORK 10583

DRAWING TITLE:
SUB-SLAB DEPRESSURIZATION SYSTEM AS-BUILT PLAN

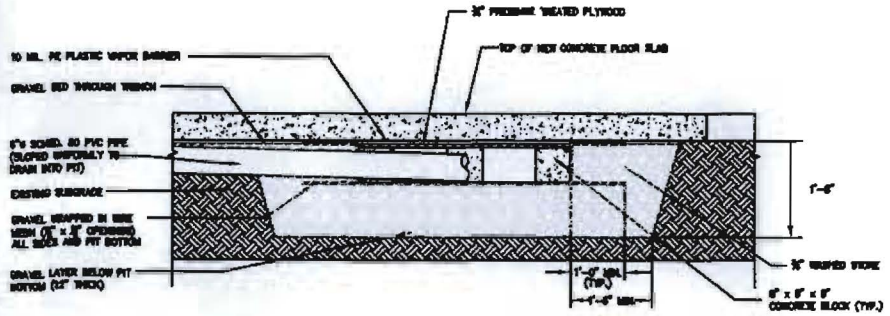
FIGURE
3



PLAN VIEW BELOW FLOOR SLAB
SUB-SLAB DEPRESSURIZATION PIT
NTS

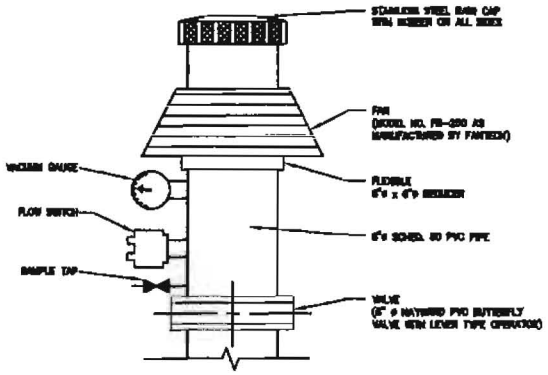


MONITORING POINT DETAIL
NTS



SECTION A-A
SUB-SLAB DEPRESSURIZATION PIT
NTS

NOTE:
DIMENSIONS ARE APPROXIMATE.



ABOVE ROOF DETAIL
NTS

SEAL
STATE OF NEW YORK
JENNIFER ANN DIPILATO
No. 085404-1
LICENSED PROFESSIONAL ENGINEER

JENNIFER ANN DIPILATO, PE
NY PE # 085404-1
DATE: MARCH 28, 2011

NOT TO SCALE

PAPER SIZE: 8½" x 11"

TRC
1430 BROADWAY, 10TH FLOOR
NEW YORK, NEW YORK 10018
212-221-7822

DESIGNED BY: JD	
DRAWN BY: HD	
CHECKED BY: DSG	
DATE: MARCH 2011	
SCALE: NOT TO SCALE	
PROJECT NUMBER: 150516.0000.0000	

PROJECT NAME
FINAL ENGINEERING REPORT
GOLDEN HORSESHOE SHOPPING CENTER
SCARSDALE, NEW YORK 10583

DRAWING TITLE
SUB-SLAB DEPRESSURIZATION SYSTEM AS-BUILT DETAILS

FIGURE
4

APPENDIX A

Digital Copy of the FER (CD)

APPENDIX B

NYSDEC Correspondence

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A
625 Broadway, 11th Floor
Albany, New York 12233-7015
Phone: (518) 402-9625 • **Fax:** (518) 402-9022
Website: www.dec.state.ny.us

Denise M. Sheehan
Commissioner

September 25, 2006

Scarsdale Shopping Center Associates, LLC
c/o Mr. David A. Roth, Esq.
Schenck, Price, Smith & King, LLP
10 Washington Street
Morristown, New Jersey 07963-0905

Re: Golden Horseshoe Shopping Center
VCP Site No. V00309-3
Scarsdale, Westchester County

Dear Mr. Roth:

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) has reviewed the Interim Report prepared by TRC Engineers, Inc. dated May 2, 2006for the above-referenced property in Scarsdale, New York. The report documents the results of sampling of the 6 existing groundwater monitoring wells and shows that there were no contaminants detected at a concentration above the Class GA standards and guidance values.

Based on our review of the TRC report, and previous reports provided, the Department has concluded that the work was performed in a manner consistent with the above referenced VCP site's draft Remedial Action Workplan (RAWP) and that no further action is warranted for soil and groundwater associated with the documented disposal area behind the former Golden Horseshoe property.

As you are aware, the final item that needs to be addressed is soil vapor and indoor air. It is our understanding that a proposal for a subslab depressurization system, or other appropriate and acceptable action, to address soil vapor and indoor air will be submitted in response to this letter. Upon receipt of a proposal acceptable to the Departments, the RAWP with the Soil Vapor component will be noticed for public comment in anticipation of formal approval.

Sincerely,

Joseph A. Yavonditte, P.E.
Chief, Remedial Section B
Remedial Bureau A

ecc: M. Rivara, NYSDOH
B. Callahan, NYSDOH
R. Mitchell, NYSDOH
J. Yavonditte
K. Maloney

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A
625 Broadway, 11th Floor
Albany, New York 12233-7015
Phone: (518) 402-9622 • **Fax:** (518) 402-9022
Website: www.dec.state.ny.us

March 12, 2007

Mr. William Silveri
Senior Project Manager
TRC Solutions
1430 Broadway, 10th Floor
New York, New York 10018

Re: Golden Horseshoe Shopping Center
VCP Site No. V00309-3
Scarsdale, Westchester County

Dear Mr. Silveri:

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) have reviewed the Work Plan Addendum Report for the above-referenced property in Scarsdale, New York.

The agencies are in agreement that it is appropriate to install a sub-slab depressurization system for the 1963 and 1984 additions to the building. Based upon the results provided in the report, there does not appear to be a need for mitigation in other sections of the building.

Additionally, the Volunteer should notify the tenants of the results of the samples collected in their businesses. Tenants should also be provided with the contact information of both the NYSDEC and NYSDOH project managers. Please keep in mind that the agencies should be allowed to preview any written material that will be given to the tenants.

If you have any questions, please feel free to contact me at 518-402-9622 or via email at kamalone@gw.dec.state.ny.us.

Sincerely,

Kerry A. Maloney
Project Manager

APPENDIX C

Manufacturer Documentation

Fantech

Installation Instructions for MODEL FR

IMPORTANT: Read These Instructions Completely Before Installing Fan And Save These Instructions For Future Reference.

Items Included: One FR fan, one mounting bracket, mounting hardware

Regular Kits Also Include: Grill with mounting collar/backdraft damper combination, duct mounting clamps

Deluxe Kits Also Include: 2 Grills with mounting collar/backdraft damper combination, "Y" transition, duct mounting clamps, balancing damper

Additional Items Needed: Duct work, duct tape or mounting clamps, duct termination device (roof cap, louvered shutter, etc.)

Tools Required: Electric drill, drill bits, regular screwdriver, phillips screwdriver, razor knife, keyhole saw (optional)

Instructions pour l'installation du MODÈLE FR

IMPORTANT: Lisez ces instructions complètement avant d'installer le ventilateur et sauvegardez ces Instructions pour de future référence.

Articles inclus : Un ventilateur FR, un support, matériel de support.

Les Kits Réguliers incluent en outre : Grille avec les fixations pour le collier/décharge du régulateur, les pinces de fixation du tuyau.

Les kits de luxe inclus également : 2 Grilles avec les fixations pour le collier/décharge du régulateur, raccordement en "Y", les pinces de fixation du tuyau, du régulateur d'équilibrage.

Les articles supplémentaires nécessaires : Le tuyau, le ruban adhésif ou les pinces de fixation, le dispositif de connexion du tuyau (couvercle du toit, porte-volets, etc.).

Les outils nécessaires : une perceuse électrique, outils de forage, un tournevis normal, un tournevis pour vis de crosse, un couteau rasoir, une scie passe partout (optionnel).

Instrucciones de instalacion del MODELO FR

IMPORTANTE: Lea a Fondo Estas Instrucciones Antes de Instalar el Ventilador, y Consérvelas para Referencia Futura.

Renglones Incluidos: Un ventilador FR, un soporte de montaje y tornillería

Los Juegos Regulares También Incluyen: Rejilla con conjunto de collarín de montaje y mariposa de contratiro, y abrazaderas de montaje del conducto

Los Juegos de Lujo También Incluyen: 2 Rejillas con conjunto de collarín de montaje y mariposa de contratiro; adaptador en "Y", abrazaderas de montaje del conducto y mariposa compensadora

Renglones Adicionales Requeridos: Conductos, cinta para conductos o abrazaderas de montaje, dispositivo de terminal del conducto (capucha de terminación en el techo, juego de persianas, etc.)

Herramientas Necesarias: Taladro eléctrico, barrenas, destornillador recto, destornillador Phillips, navaja, sierra caladora (opcional)

Installing Mounting Bracket & Fan

1. When selecting fan mounting location, the following criteria should be considered: *a) mounting to minimize noise generated by fan operation; b) service accessibility*
   a) Mounting the fan as far as possible from the intake point will minimize fan operating noise from being transmitted back through the duct work. If the fan is to be used as a booster for moving the air between two rooms, a central point along the duct may be optimal. Insulated flexible type duct work (recommended for all bathroom exhaust applications) will result in much quieter operation. Fantech recommends minimum 8' of insulated flexible duct between any exhaust grill and fan for low noise level.
   b) Fan location should allow sufficient access for service.


Mount Bracket (NB).


Mount Fan.

2. Using the wood screws provided, attach the mounting bracket (NB or MB) to a support beam at the selected location. Fan mounting can be at any point along the duct and in any angle, however, vertical mounting is recommended to reduce condensation buildup in the fan. If a horizontal installation is necessary and condensation buildup may pose a problem, either wrap insulation around the fan or drill a ¼" hole in the bottom of the housing (along with an NPT insert [by others] and drain tubing) allowing condensation to drain.
3. Attach fan to the mounting bracket with the sheet metal screws provided. Wiring box should be positioned for easy access. Bracket is provided with rubber vibration isolation grommets to prevent the transmission of sound through the structure. Be careful not to overtighten. Also, care should be taken not to strip the plastic housing. Screws are self tapping and do not require pilot holes. However, pilot holes (no larger than 9/32") are recommended.
4. Connect duct work to inlet and outlet of fan using CB clamps or duct tape. When using insulated duct, it is recommended that the inner vinyl core be clamped or taped to the inlet and outlet and that the vapor barrier surrounding the insulation be duct taped to the fan housing.


Mount Bracket (MB).


Mount Fan.

NOTE: Steps 2 & 3 may be reversed.

Installing DG Supply/Exhaust Grill

If a Vent/Light combination kit is purchased, the VLC vent/lights are supplied with a separate installation instruction replacing steps 1 through 4.

1. Select the grill mounting point within the area to be ventilated. To ease installation, locations of framing beams within the walls or joists supporting the ceiling should be considered. Collar/damper is provided with a perforated hanging strap for attachment directly to a beam or joist. Allow sufficient space between the collar/damper and the beam to attach the duct work. If the location of the grill does not allow direct attachment, a cross-member mounted to the framing should be used.


Mount Collar

2. Place the mounting collar/damper in the selected location and trace a circle onto the surface. From the interior side of the room, cut through the surface. Please note: In order to assure a smoother finish when mounting through a sheetrock or tile type ceiling, it is recommended that a razor knife be used to make the cut.


Side view grill and collar.

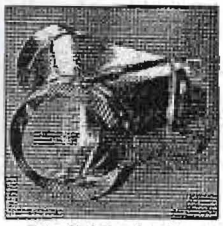
3. From within the attic or crawl space, place the mounting collar into the hole until the edge of the collar is flush with the interior wall or ceiling surface. Attach collar to the support beam with the 2" wood screws provided. Attach duct work. Secure using CB or FC clamps and/or duct tape. When installing the damper into rigid type ducting, FC clamps or duct tape should be used.

   PLEASE NOTE: *When attaching flex duct to the collar/damper combination and an immediate elbow is necessary, be certain that the elbow is installed with a "soft" bend to allow damper blades to operate properly.*

4. Snap the grill into the mounting collar/damper. Grill should be pushed tightly into place for an airtight fit. If there is a gap between the collar and the ceiling it should be caulked to avoid air leakage. For subsequent cleaning the grill can be pulled out and cleaned.

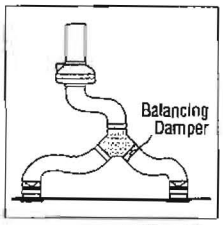
Installing DG Supply/Exhaust Grill

When installing a **DLX kit**, a balancing damper has been included to allow for adjustment of the system. The damper may be used where the grills will be connected using branches of unequal length or where the flow will need to be balanced for any reason.


"Y" with balancing damper.

To Install The Damper:

1. The Damper must be installed on the branch with the least restriction.
   This is generally the duct that is shortest or has the fewest bends.
2. Drill a 5/16" hole approximately 1½" from the edge on the flat side of the "Y".
3. Place the washer over the threaded shaft on the damper.
4. Insert the damper, shaft first, into the hole just drillad.
5. Attach the handle using the wing nut.
6. Adjust the damper to balance airflow and tighten the wing nut to secure.



FR Series Fan
and balancing damper.

Flexible Duct Installation Hints

Flexible insulated duct is strongly recommended where allowed by local code for bathroom exhaust applications, where ducting passes through unconditioned space or where noise is a factor. Failure to use insulation could result in excessive condensation buildup within the duct, and undesirable sound levels within the room. For the quietest possible installations, Fantech recommends a minimum of 8' of insulated flexduct between any exhaust grill and fan. When using flexible type duct work, duct should be stretched as tight and straight as possible. Failure to do so could result in dramatic loss of system performance. Flexible duct should be connected to the fan with CB type clamps or duct tape. All connections should be as airtight as possible to maximize system performance.

Warnings

DO NOT CONNECT POWER SUPPLY until fan is completely installed. Make sure electrical service to the fan is locked in "OFF" position

1. All units are suitable for use with solid-state speed control.
2. This unit has rotating parts and safety precautions should be exercised during installation, operation and maintenance.
3. **CAUTION:** "For General Ventilation Use Only. Do Not Use To Exhaust Hazardous Or Explosive Materials And Vapors."
4. **WARNING: To reduce the risk of fire, electrical shock, or injury to persons-observe the following:**
   a. Use this unit only in the manner intended by the manufacturer. If you have questions, contact the factory.
   b. Before servicing or cleaning, switch power off at service panel and lock service panel to prevent fan from being switched on accidentally.
   c. Installation work and electrical wiring must be done by qualified person(s) in accordance with all applicable codes and standards, including fire-rated construction.
   d. The combustion airflow needed for safe operation of fuel burning equipment may be affected by this unit's operation. Follow the heating equipment manufacturer's guidelines and safety standards such as those published by the National Fire Protection Association (NFPA), the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) and the local code authorities.
   e. When cutting or drilling into wall or ceiling, do not damage electrical wires or other hidden utilities.
   f. Exhaust fans must always be vented to the outdoors.
   g. Acceptable for use over a bathtub or shower.
   h. NEVER place a switch where it can be reached from a tub or shower.
5. **WARNING!** Check voltage at the fan to see if it corresponds to the motor nameplate.

GUARDS MUST BE INSTALLED WHEN FAN IS WITHIN REACH OF PERSONNEL OR WITHIN SEVEN (7) FEET OF WORKING LEVEL OR WHEN DEEMED ADVISABLE FOR SAFETY.

Electrical Connection

1. Remove the screws securing the terminal box cover plate located on the side of the fan. All fan motor connections are pre-wired to an electrical terminal strip. A ⅜" romex type cable restraint connector will be needed to secure the wiring through the knockout provided on the side of the terminal box.
2. Bring incoming electrical service through the romex connector and the fan knockout. Be sure to place the connector nut over the wiring coming into the terminal box. There are two open ports on the terminal strip. Using a small regular screwdriver, tighten the neutral (white) wire of the incoming supply under the open terminal strip port labeled "N". Tighten the line (black) wire of the incoming supply under the open terminal strip port labeled "L". Since the fan motor is isolated within a plastic housing, grounding is not necessary.
3. Secure the romex connector. Secure the incoming supply with the romex connector. Replace the fan terminal box cover. All fan motor and capacitor connections have been pre-wired from the factory. No additional fan wiring is necessary.

Liquid tight wiring – Top View (For outside applications).

Romex wiring – Top View

Troubleshooting

If fan fails to operate, please check the following:

1. Consult wiring diagrams (see below) to insure proper connection.
2. Check motor lead wiring, capacitor leads and incoming supply leads to insure definite contact.
3. If possible, use a meter to test for continuity across the fan motor leads. In order to do this, the capacitor must be disconnected (do not test the capacitor - it will not meter continuity). If motor leads show continuity, consult factory for a replacement capacitor.

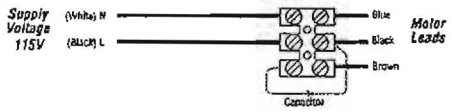
Maintenance Instructions

Since fan bearings are sealed and provided with an internal lubricating material, no additional lubrication is necessary.

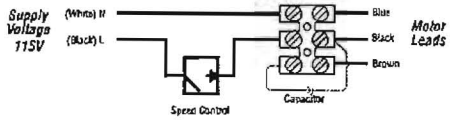
Wiring Diagrams

All Models

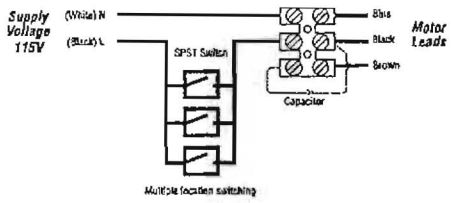
Without Motor Speed Controller



With Motor Speed Controller



Multiple Location Switching Wiring Diagram



Five (5) Year Warranty

DURING ENTIRE WARRANTY PERIOD:
FANTECH will repair or replace any part which has a factory defect in workmanship or material. Product may need to be returned to the Fantech factory, together with a copy of the bill of sale and identified with RMA number.

FOR FACTORY RETURN YOU MUST:
- Have a Return Materials Authorization (RMA) number. This may be obtained by calling FANTECH either in the USA at 1.800.747.1762 or in CANADA at 1.800.565.3548. Please have bill of sale available.
- The RMA number must be clearly written on the outside of the carton, or the carton will be refused.
- All parts and/or product will be repaired/replaced and shipped back to buyer; no credit will be issued.

OR
The Distributor may place an order for the warranty part and/or product and is invoiced. The Distributor will receive a credit equal to the invoice only after product is returned prepaid and verified to be defective.

FANTECH WARRANTY TERMS DO NOT PROVIDE FOR REPLACEMENT WITHOUT CHARGE PRIOR TO INSPECTION FOR A DEFECT.
REPLACEMENTS ISSUED IN ADVANCE OF DEFECT INSPECTION ARE INVOICED, AND CREDIT IS PENDING INSPECTION OF RETURNED
MATERIAL. DEFECTIVE MATERIAL RETURNED BY END USERS SHOULD NOT BE REPLACED BY THE DISTRIBUTOR WITHOUT CHARGE TO THE END USER, AS CREDIT TO DISTRIBUTOR'S ACCOUNT WILL BE PENDING INSPECTION AND VERIFICATION OF ACTUAL DEFECT BY FANTECH.

THE FOLLOWING WARRANTIES DO NOT APPLY:
- Damages from shipping, either concealed or visible. Claim must be filed with freight company.
- Damages resulting from improper wiring or installation.
- Damages or failure caused by acts of God, or resulting from improper consumer procedures, such as:
  1. Improper maintenance
  2. Misuse, abuse, abnormal use, or accident, and
  3. Incorrect electrical voltage or current.
- Removal or any alteration made on the FANTECH label control number or date of manufacture.
- Any other warranty, expressed, implied or written, and to any consequential or incidental damages, loss or property, revenues, or profit, or costs of removal, installation or reinstallation, for any breach of warranty.

WARRANTY VALIDATION
- The user must keep a copy of the bill of sale to verify purchase date.
- These warranties give you specific legal rights, and are subject to an applicable consumer protection legislation. You may have additional rights which vary from state to state.

Garantie de 5 ans

La présente garantie remplace toutes les garanties antérieures.

DURANT TOUTE LA PÉRIODE DE GARANTIE:
FANTECH, INC. s'engage à réparer ou à remplacer toute pièce présentant un défaut d'usine en matière de qualité d'exécution ou de matériau. Il sera peut être nécessaire de retourner le produit à l'usine FANTECH, accompagné d'une copie du contrat de vente et du numéro d'autorisation de retour.

POUR RETOURNER UN PRODUIT À L'USINE, VOUS DEVEZ:
- Obtenir un numéro d'autorisation de retour; pour ce faire, communiquer avec FANTECH, INC. aux États-Unis au numéro 1 800 747-1762, ou au Canada, au numéro 1 800 565-3548. Veuillez avoir votre contrat de vente à portée de la main.
- S'assurer que le numéro d'autorisation de retour est lisible sur l'extérieur de la boîte, sinon la boîte sera refusée.
- Toutes les pièces et/ou le produit seront réparés ou remplacés puis retournés à l'acheteur. Aucun crédit ne sera accordé.

OU
Le Distributeur peut commander une pièce ou un produit couvert par la garantie; la facture lui sera envoyée. Le distributeur ne sera crédité du montant de sa facture qu'après que le produit a été retourné port payé et qu'il a été trouvé défectueux.
LES TERMES DE LA GARANTIE DE FANTECH NE PRÉVOIENT PAS DE REMPLACEMENT SANS FRAIS AVANT QUE LA PIÈCE OU LE PRODUIT DÉFECTUEUX AIT ÉTÉ INSPECTÉ. LES PRODUITS OU PIÈCES REMPLACÉS AVANT L'INSPECTION DE LA DÉFECTUOSITÉ SERONT FACTURÉS ET LE MONTANT OU CRÉDIT EST FONCTION DE L'INSPECTION DE LA PIÈCE OU OU PRODUIT RETOURNÉ. LE DISTRIBUTEUR NE DOIT PAS REMPLACER SANS FRAIS POUR L'UTILISATEUR FINAL L'ÉQUIPEMENT DÉFECTUEUX RETOURNÉ PAR L'UTILISATEUR FINAL, CAR LE COMPTE DU DISTRIBUTEUR NE SERA CRÉDITÉ QU'APRÈS L'INSPECTION ET LA VÉRIFICATION PAR FANTECH DE LA DÉFECTUOSITÉ.

LES GARANTIES NE S'APPLIQUENT PAS DANS LES CAS SUIVANTS:
- Dommages dus au transport (dissimulés ou visibles). Les réclamations doivent être faites à la compagnie de fret.
- Dommages dus au mauvais câblage ou à l'installation inappropriée.
- Dommages ou défectuosité causés par une calamité naturelle ou résultant d'une procédure irrégulière de l'acheteur, notamment :
  1. Entretien irrégulier
  2. Mauvais usage, usage abusif, usage anormal ou accident
  3. Tension ou courant électrique incorrect
- Enlèvement ou toute modification du numéro de contrôle ou de la date de fabrication de l'étiquette FANTECH
- Toute autre garantie expresse, écrite ou implicite, pour les dommages accidentels ou indirects, perte de biens, de recettes, manque à gagner ou coûts relatifs à la dépose, à l'installation ou à la réinstallation, en cas de violation de garantie.

CERTIFICATION DE LA GARANTIE:
- L'utilisateur doit conserver une copie du contrat de vente pour confirmer la date d'achat.
- Les présentes garanties vous donnent des droits spécifiques reconnus par la loi et sont régies par les lois sur la protection du consommateur appropriées. Il est possible que différents états offrent d'autres droits.

Garantia por cinco (5) años

Esta garantía reemplaza toda otra garantía anterior.

DURANTE EL PERÍODO INTEGRO DE LA GARANTÍA:
FANTECH reparará o reemplazará toda parte que presente un defecto en el material o en la mano de obra. Es posible que el producto deba ser devuelto a la fabrica FANTECH, juntamente con una copia de la constancia de compraventa e identificado con el número de RMA.

PARA DEVOLUCIÓN A FÁBRICA USTED DEBE:
- Tener un número de Autorización de Devolución de Material (RMA). Esto se puede obtener llamando a FANTECH ya sea en los Estados Unidos al 1.800.747.1762
- en Canadá al 1.800.565.3548. Tenga a mano la constancia de compraventa.
- El número de RMA deberá estar claramente escrito en la parte exterior de la caja, de lo contrario la caja será rechazada.
- Todas las partes y/o el producto serán reparados/reemplazados y devueltos al comprador; no se otorgará crédito.

O BIEN
El Distribuidor puede colocar una orden por la parte y/o producto en garantía y facturaría/o. El Distribuidor recibirá un crédito igual a la factura sólo después de que se haya devuelto el producto con pago previo y con verificación de defecto.
LAS CONDICIONES DE LA GARANTÍA DE FANTECH NO CONTEMPLAN EL REEMPLAZO SIN CARGO ANTES DE REALIZAR LA INSPECCIÓN PARA DETECTAR DEFECTOS. LOS REEMPLAZOS EMITIDOS ANTES DE INSPECCIONAR POR DEFECTOS SON FACTURADOS, Y EL CRÉDITO ESTÁ A LA ESPERA DE INSPECCIÓN DEL MATERIAL DEVUELTO. EL MATERIAL DEFECTUOSO DEVUELTO POR LOS USUARIOS FINALES NO DEBERÁ SER REEMPLAZADO POR EL DISTRIBUIDOR SIN CARGO PARA EL USUARIO FINAL, YA QUE EL CRÉDITO DE LA CUENTA DEL DISTRIBUIDOR ESTARÁ A LA ESPERA DE INSPECCIÓN Y VERIFICACIÓN DEL DEFECTO REAL POR FANTECH.

LAS SIGUIENTES GARANTÍAS NO SE APLICAN:
- Daños durante el envío, ya sean encubiertos o visibles. Se deberá presentar el reclamo a la compañía transportadora.
- Daños ocasionados por cableado o instalación indebidos.
- Daños o fallas causados por hechos fortuitos, u ocasionados por procedimientos impropios por parte del usuario, tales como:
  1. Mantenimiento indebido
  2. Uso indebido, abuso, uso anormal o accidente y
  3. Tensión o corriente eléctrica incorrecta.
- Remoción o modificación realizada al número de control del rótulo de FANTECH o de la fecha de fabricación.
- Toda otra garantía, expresa, implícita o escrita, daños y perjuicios, pérdida de propiedad, de ingresos, o de beneficios, o costo de remoción, instalación o reinstalación por incumplimiento de la garantía.

VALIDACIÓN DE LA GARANTÍA
- El usuario debe conservar una copia de la constancia de compraventa para verificar la fecha de compra.
- Estas garantías le otorgan derechos legales específicos, y están sujetas a una legislación aplicable para protección del consumidor. Usted puede tener derechos adicionales que varían de estado en estado.

United States
1712 Northgate Blvd.
Sarasota, FL. 34234
Phone: 800.747.1762; 941.309.6000
Fax: 800.487.9915; 941.309.6099
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Canada
50 Kanalflakt Way
Bouctouche, NB E4S 3M5
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Fax: 877.747.8116; 506.743.9600
www.fantech.ca; info@fantech.ca

Item #: 401444 • Rev Date: 040605

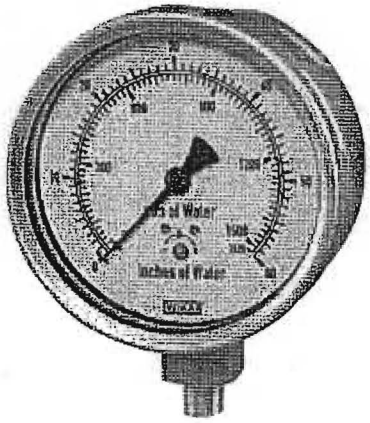
Capsule Pressure Gauge
Model 612.20, Stainless Steel Case

Applications

- Low pressure pneumatic systems
- Suitable for fluid medium, gaseous or dry that does not corrode copper alloy.

Special features

- Low pressure series
- Copper alloy wetted parts & stainless steel case
- Capsule pressure gauge



Pressure Gauge 612.20

Standard version

Size
4" (100mm) & 6" (160mm)

Accuracy class
± 1.5% of span

Ranges (All ranges not stocked)
2.5" H_2O to 275" H_2O (6 to 685 mbar) or other equivalent units of pressure or vacuum

Connection
Material: copper alloy
Lower mount (LM)
Lower back mount (LBM)
1/4" NPT or 1/2" NPT

Capsule Element
Material: copper alloy

Movement
Copper alloy, nickel-silver pinion gear and shaft.
Zero adjustment screw on dial

Dial
White aluminum with black lettering

Pointer
Black aluminum (zero adjust on dial. Must remove window to access)

Case
304 stainless steel with stainless steel bayonet ring

Weather Protection
Weather resistant (NEMA 3 / IP 54)

Standard Scales
in. H_2O/mm H_2O
oz.-sq. in./mm H_2O
oz.-sq. in./in. H_2O
PSI

Window Gasket
Buna-N

Window
Flat window glass

Working Range

Steady:	Full scale value
Fluctuating:	0.9 x full scale value

Operating Temperature

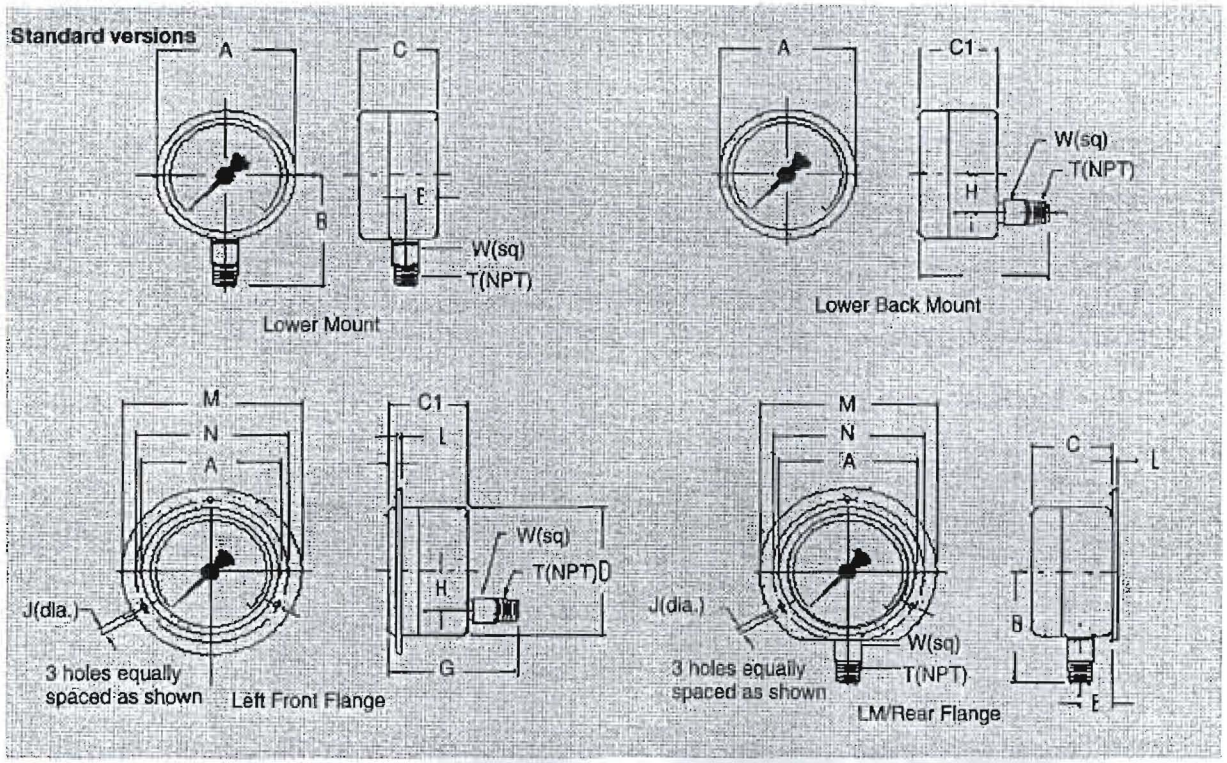
Ambient:	-4°F to 140°F (-20°C to 60°C)
Media:	max. 212°F (+100°C)
	max. 176°F (+80°C) for 4" LBM

Temperature error
Additional error when temperature changes from reference temperature of 68°F (20°C) ±0.4% for every 18°F (10°C) rising or falling. Percentage of span.

Optional Extras

- Front stainless steel polished
- Brass threaded restrictor
- U-Clamp bracket steel zinc plated wiht stainless steel polished profile ring
- Safety glass window
- Overpressure and underpressure protection
- Cleaned for oxygen service
- Medical specification
- Special connections limited to wrench flat area
- Nickel plated connection
- Externally adjustable red mark pointer (set pointer)
- Externally adjustable red drag pointer (max. pointer)
- Custom dial layout
- DIN standards
- Other pressure scales available

Dimensions



A' NOMINAL SIZE																
TYPE/SIZE	WEIGHT	KEY	A	B	C	C1	D	E	G	H	J	L	M	N	T	W
612.20	1.32 lbs	mm	101	65	49.3	49.3	104	15.5	78	30	4.8	3	132	116	1/2" or 1/4"	22
4"		in	4	3.35	1.94	1.94	4.09	0.61	3.07	1.18	0.19	0.12	5.2	4.57	1/2" or 1/4"	0.86

Note: For 1/4" NPT connections, B dimension changes to 80mm / 3.15 in.
Recommended panel cut-out: D + 1mm

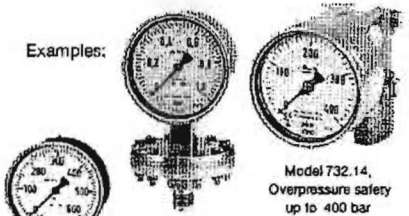
Ordering information
State computer part number (if available) /type number/size/range/connection size and locations/options required. WIKA reserves the right to make changes without prior notice.

WIKA Instrument Corporation
1000 Wiegand Boulevard
Lawrenceville, GA 30043
1-888-WIKA-USA /770-513-8200 (in GA)
Fax 770-338-5118
info@wika.com www.wika.com

Operating Instructions

Pressure Gauges

Examples:



Model 732.14, Overpressure safety up to 400 bar

Model 432.36, Overpressure safety up to 400 bar

Model 213.40

WIKA

Part of your business

Notes according to
Pressure Equipment Directive 97/23/EC

- The pressure gauges are "pressure accessories" in accordance with article 1, paragraph 2.1.4
- The volume of the pressure bearing housings of WIKA pressure gauges is < 0.1 L
- The pressure gauges carry the CE marking for fluid group 1G in accordance with annex 2, table 1 when their permissible working pressure exceeds 200 bar

  Pressure gauges that do not carry the CE marking are manufactured in accordance with article 3, paragraph 3 "sound engineering practice".

Applied standard

EN 837-1	Bourdon tube pressure gauges, Dimensions, metrology, requirements and testing
EN 837-2	Selection and installation recommendations for pressure gauges
EN 837-3	Diaphragm and capsule pressure gauges, Dimensions, metrology, requirements and testing

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www.wika.de

2408976 09/2006

1. Safety Instructions

The user must ensure that the appropriate pressure gauge with regard to scale range and performance and the appropriate wetted material (corrosion) for the specific measuring conditions of the respective application is selected. In order to guarantee the accuracy and long-term stability specified, the corresponding load limits are to be observed. Specifications: see data sheet under www.wika.de

Only qualified persons authorised by the plant manager are permitted to install, maintain and service the pressure gauges.

Dangerous pressure media such as Oxygen, Acetylene, flammable gases or liquids, toxic gases or liquids as well as for refrigeration plants or compressors requires attention above the standard regulations. Here the specific safety codes or regulations must be considered.

After an external fire pressure media can leak out particularly at soft solder joints. All gauges have to be checked and, if necessary, replaced before recommissioning the plant.

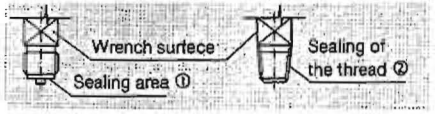
Serious injuries and/or damage can occur should the appropriate regulations not be observed.

2. Mechanical connection

According to the general technical regulations for pressure gauges, respectively (i.e. EN 837-2). When screw-fitting the gauges the force required for this must not be applied through the case or terminal box but just through the spanner flats (with suitable tool) provided for this purpose.

Installation with open-ended spanner

Correct sealing of pressure gauge connections with parallel thread ① shall be means of a suitable sealing ring, sealing washer or WIKA profile seals. The sealing of tapered threads (e.g. NPT threads) is made by providing the thread ②, with additional sealing material like, for example, PTFE tape (EN 837-2).



The torque depends on the seal used. With standard G-type pipe thread, gauge connection by means of a union nut or a LH-RH adjusting nut is recommended to simplify correct orientation of the gauge. When a blow-out device is fitted to a pressure gauge it shall be resistant to blocking by debris and dirt.
With safety pattern gauges (see dial symbol Ⓢ) you need to pay attention to the fact that the free space behind the blow-out back will be at least 15 mm.

2.1 Requirements for the installation point

If the measuring point is not adequately stable a measuring instrument support such as a bracket or flange should be used for fastening (and possibly via a flexible capillary line). If the pressure gauge is exposed to vibration or pulsating pressure or both, than a liquid filled pressure gauge may provide considerably better performance and readability. Instruments should be protected against coarse dirt and wide fluctuations in ambient temperature. EN 837-2 "Selection and installation recommendations for pressure gauges" should be complied with.

3. Admissible ambient and working temperatures

When installing the pressure gauge it has to be ensured that, taking the influence of convection and heat radiation into consideration, no upper or lower deviation from the permissible ambient and medium temperatures can occur. The influence of temperature on the class accuracy is to be observed.

4. Storage

The pressure gauge should remain in its original packing until installation. The gauge should be protected from external damage during storage. Storage temperature: -40 °C ... +70 °C. Pressure gauges removed from service should be protected from dust and humidity.

5. Maintenance and servicing / Repairs

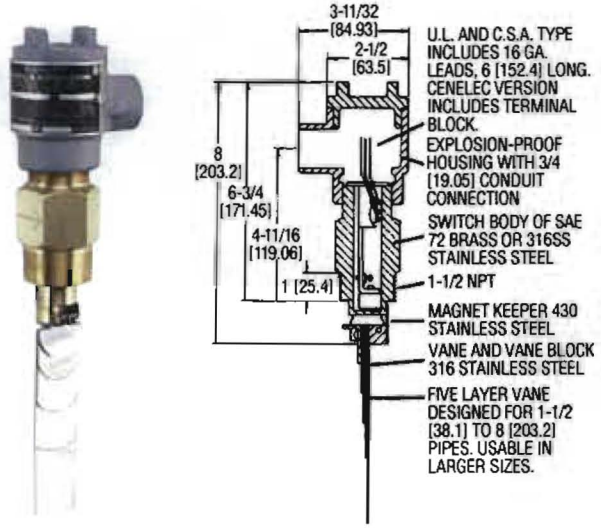
The instruments require no maintenance or servicing. Tests should be carried out on a regular basis to guarantee the measuring accuracy of the pressure gauge. The tests or recalibrations have to be carried out by qualified persons with the appropriate equipment.

Remainder of the pressure medium contained in the pressure element may be hazardous or toxic. This should be considered when handling and storing the removed pressure gauge.

Series V4

FLOTECT® Vane Operated Flow Switch

Specifications - Installation and Operating Instructions



Rugged and reliable the Flotect® V4 flow switch operates automatically to protect equipment and pipeline systems against damage from reduction or loss of flow. The V4 is time tested being installed in thousands of pipelines and processing plants around the world. A unique magnetically actuated switching design gives superior performance. There are no bellows, springs, or seals to fail. Instead, a free-swinging vane attracts a magnet within the solid metal switch body, actuating a snap switch by means of a simpla lever arm.

FEATURES

- Leak proof body machined from bar stock
- Choice of custom vane calibrated for your application, Model V4, or field adjustable multilayer vane, Model V4-2-U (see set point chart on page 4)
- Weatherproof, designed to meet NEMA 4
- Explosion-proof (listing included in specifications)
- Installs directly and easily into pipeline with a thredolet, tee, or flange (see application drawings on page 4)
- Can be used in pipes 1-1/2" and up
- Electrical assembly can be easily replaced without removing the unit from installation so that the process does not have to be shut down
- High pressure rating of 1000 psig (69 bar) with the brass body and 2000 psig (138 bar) with the 316 SS body

APPLICATIONS

- Protects pumps, motors and other equipment against low or no flow
- Controls sequential operation of pumps
- Automatically starts auxiliary pumps and engines
- Stops liquid cooled engines, mechines and processing when coolant flow is interrupted
- Shuts down burner when air flow through heating coil fails
- Controls dampers according to flow

SPECIFICATIONS

Service: Gases or liquids compatible with wetted materials.
Wetted Materials:
Vane: 316 SS
Body: Brass or 316 SS standard.
Magnet Keeper: 430 SS standard, 316 SS optional.
Options: Other materials also available, consult factory (e.g. PVC, Hastelloy, Nickel, Monel, Titanium).
Temperature Limit: -4 to 275°F (-20 to 135°C) standard, MT high temperature option 400°F (205°C) [MT option not UL, CSA, ATEX, or SAA].
Pressure Limit: Brass body 1000 psig (69 bar), 316 SS body 2000 psig (138 bar), optional 5000 psig (345 bar) available with 316 SS body and SPDT switch only.
Enclosure Rating: Weatherproof and Explosion-proof. Listed with UL and CSA for Class I, Groups C and D; Class II, Groups E, F, and G.
ATEX CE 0344 Ex II 2 G EEx d IIB T6 -20°C≤Tamb≤75°C
EC-Type Certificate No.: KEMA 03ATEX 2383
SAA: Exd II C T6 (T amb=60°C).
Zone I. Also FM approved.
Switch Type: SPDT snap switch standard, DPDT snap switch optional.
Electrical Rating: UL, FM, ATEX and SAA models 10A @ 125/250 VAC (V~). CSA models: 5A @ 125/250 VAC (V~); 5A res., 3A ind. @ 30 VDC (V⎓). MV option: 1A @125 VAC (V~); 1A res., .5A ind. @ 30 VDC (V⎓). MT option: 5A @ 125/250 VAC (V~). [MT and MV option not UL, CSA, FM, ATEX or SAA].
Electrical Connections: UL and CSA models: 16 AWG, 6" (152 mm) long. ATEX and SAA unit: Terminal block.
Conduit Connection: 3/4" female NPT.
Process Connection: 1-1/2" male NPT.
Mounting Orientation: Within 5° of vertical for proper operation. Units for horizontal installation (vertical pipe with up flow) available.
Set Point Adjustment: For universal vane: five vane combinations.
Weight: 4 lb 8 oz (1.9 kg).

Notes:

- Check all ratings given in the instructions and on the product to make sure that the product is suitable for your application. Do not exceed electrical ratings, pressure ratings, or temperature ratings of the product.

- Disconnect power supply before beginning installation to prevent possible equipment damage or electrical shock.

MAINTENANCE

Inspect and clean wetted parts at regular intervals. The cover should be in place at all times to protect the internal components from dirt, dust, and weather, and to maintain hazardous location ratings. Disconnect device from the supply circuit before opening to prevent ignition of hazardous atmosphere. Repairs to be conducted by Dwyer Instruments, Inc. Units in need of repair should be returned to the factory prepaid.

W.E. ANDERSON DIV., DWYER INSTRUMENTS, INC.
P.O. BOX 358 • MICHIGAN CITY, INDIANA 46361 U.S.A.
Phone: 219/879-8000
Fax: 219/872-9057
www.dwyer-inst.com
e-mail: info@dwyer-inst.com

Example	V4	SS	3	1	6	C	F	2	S	1	V4-SS-316-C-F2S1
Construction	V4										Brass Body, SPDT Switch
Construction Options		SS									316 SS Body
		2									Type 2 Body Style
		D									DPDT Switch
		U									Universal Vane (Omit for a custom vane)
Magnet Keeper Material Options			1								430 SS (Standard)
			2								Nickel 200
			3								316 SS
Vane Material Options				1							316 SS (Standard)
				2							Carpenter 20
				3							Hastelloy B
				4							Hastelloy C
				5							Monel
Body Material Options					1						Brass (Standard)
					2						Carpenter 20
					3						CPVC*
					4						Hastelloy B
					5						Hastelloy C
					6						316 SS (Must also use SS construction selection)
					7						Monel
Other Options						AT					ATEX
						SAA					SAA Construction*
						EPOXY					Epoxy Coated Housing
						FSV					Full Swing Vane
						FTR					Flow Test Report
						HP					High Pressure*, 5000 psi (345 bar) (Only with SS body)
						HV					Hinged Vane
						MT					High Temperature* (See specifications for rating)
						MV					Gold Contact Snap Switch* (See specifications for rating)
						NACE					NACE Heat Treated Body*
						NB					Neoprene Boot*
						NH					No Electrical Housing*
						SW					Socket Weld Connection*
						TBC					Terminal Block Wire Connections*
						TRD					Time Delay Relay* (On flow decrease)
						TRI					Time Delay Relay* (On flow increase)
						V					Vertical Up Flow Applications
Flange*							F				Flange Process Connection
Flange Size								2			2"
								2.5			2-1/2"
								3			3"
								4			4"
Flange Material									C		Carbon Steel
									S		316 SS
									M		Monel
									B		Hastelloy B
									H		Hastelloy C
Flange Rating										1	150#
										3	300#
										6	600#
										9	900#
Bushing*							B				Bushing Process Connection
Bushing Size								1			2"
								2			2-1/2"
								4			4"
Bushing Type									H		Hex
									F		Flush
Bushing Material										B	Brass
										C	Carbon Steel
										S	316 SS
										4	304 SS
Tee*							T				Tee Process Connection
Tee Size								1			1-1/2"
Tee with Bushing*							TB				Tee with Bushing Process Connection (Both same material)
Tee Size								2			2"
								3			3"
Tee Material and Type										B0	Brass 125 #
										B1	Brass 150 #
										B2	Brass 250 #
										C	Carbon Steel 2000 #(Only with 2" and 3")
										CP	CPVC SCH 80
										S	316 SS 150 #
										P	PVC SCH 80

* Options that do not have ATEX

Attention: Units without the "AT" suffix are not Directive 94/9/EC (ATEX) compliant. These units are not intended for use in potentially hazardous atmospheres in the EU. These units may be CE marked for other Directives of the EU.

INSTALLATION

1. Remove packing material from switch body-cap and remove tape from magnet keeper. Adjust vane length if necessary on multi-layer vanes only (see flow rate charts on next page). Install switch in thredolet previously welded to line. In some cases, it may be necessary to install the switch in a flange or tee (see installation drawings on next page). Note: extreme care must be exercised in welding the fitting to the line so that it is plumb and level.

   ADJUSTMENT OF MULTI-LAYER VANE
   Remove only those layers which are too long. Leave the smaller layers to reinforce the vane. The longest vane fits 6" (150 mm) or larger pipe, the second longest vane fits 4" (100mm) pipe, etc. Actuation-Deactuation rates are shown in the charts on the next page. To remove vane layers, proceed as follows:

   a. Remove the two screws and lockwashers holding the layers together. Do not lose these special corrosion resistant type 316 stainless steel screws and lockwashers.

   b. Remove the unwanted layers.

   c. Resecure the vane with the original two screws and lockwashers.

   d. With a hammer, lightly peen the ends of the screws so that they can't back out.

   e. If you lose the screws or lockwashers, don't replace with other parts which may corrode and break. That will void the warrantee and might cause severe damage to equipment located downstream of the switch.

   Note: Custom vane units have been calibrated at factory to meet requirements. Do not change.

2. The arrow on the side of the switch must point in the direction of flow.

3. Wiring: UL and CSA units only: thread connecting wires through conduit and connect. Wire in accordance with local electrical codes.
   Black - Common
   Blue - N.O.
   Red - N.C.

   Note: Double pole, double throw switches have dual black, blue and red leads. These are connected in the same manner as single pole, double throw switches, as described above.

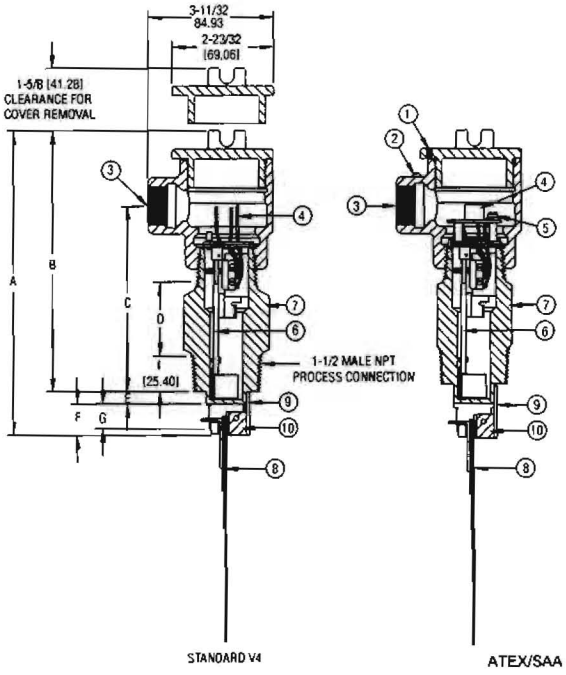
   EC-Type Certificate Installation Instructions:
   Cable Connection
   The cable entry device shall be an EEx d certified cable gland suitable for conditions of use and correctly installed. The certified cable gland and cable shall be rated for a minimum temperature of 80°C.

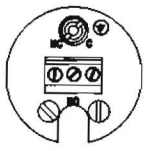
   Conduit Connection
   An EEx d certified seal device such as a conduit seal with setting compound suitable for conditions of use and correctly installed shall be provided immediately to the entrance of the electrical housing. The certified conduit seal with setting compound and cable shall be rated for a minimum temperature of 80°C.

   Note: The switch is deactivated and contacts are in normal condition when there is no flow in the line.

4. Make sure conduit or cable are properly sealed. Electrical components must be kept free of moisture, including condensation, at all times. **CAUTION:** To prevent ignition of hazardous atmosphere, disconnect the device from the supply circuit before opening. Keep assembly tightly closed when in operation.

   Note: ATEX units only: The temperature class is determined by the *maximum ambient or medium/process* temperature. The approved ratings are: T6 -20°C≤Tamb≤75°C. Product may be used in a maximum ambient or medium/process temperature of 75°C.





TERMINAL CONNECTIONS SPDT

TERMINAL CONNECTIONS DPDT

Dim	V4 in(mm)	V4-2 in(mm)
A	8-3/16 (207.96)	8 (203.20)
B	6 (152.40)	6-3/4 (171.45)
C	4-11/16 (119.06)	3-15/16 (100.01)
D	1 (25.40)	1-3/4 (44.45)
E	1-5/16 (33.34)	9/16 (14.30)
F	7/8 (22.23)	11/16 (17.63)
G	11/16 (17.46)	1/2 (12.70)

Ref #	Standard V4	ATEX/SAA
1	N/A	Cover lock.
2	N/A	External ground.
3	Explosion-proof housing with 3/4" female NPT conduit connection.	Explosion-proof housing with 3/4" female NPT conduit connection.
4	16 AWG, 6" (152 mm) long.	Terminal Block
5	Internal	Internal ground.
6	Magnet arm and switch assembly.	Magnet arm and switch assembly.
7	Switch body of SAE 72 Brass or 316 SS.	Switch body of SAE 72 Brass or 316 Stainless Steel.
8	Five layer vane, 316 Stainless Steel, Designed for 1/2" to 8" pipes. Usable in larger pipe sizes.	Five layer vane, 316 Stainless Steel, Designed for 1/2" to 8" pipes. Usable in larger pipe sizes.
9	Magnet keeper of 430 Stainless Steel.	Magnet keeper of 430 Stainless Steel.
10	Vane block of 316 Stainless Steel.	Vane block of 316 Stainless Steel.

V4 Universal Vane Flow Charts

Values shown in both charts are nominal. If normal flows exceed actuation rates by less than 10%, custom vanes are recommended. Figures are based on standard vertical installation in a 1-1/2" thredolet in a horizontal run of pipe.

APPROXIMATE ACTUATION/DEACTUATION FLOW RATES FOR COLD WATER.
UPPER FIGURES IN GPM. LOWER FIGURES IN LPM

VANE LAYERS	1.5"PIPE	2"PIPE	3"PIPE	4"PIPE	6"PIPE	8"PIPE	10"PIPE	12"PIPE	14"PIPE	16"PIPE	18"PIPE	20"PIPE
1	7-3 26.67-11.67	15-8 56.7-30	45-22 167-83.3	95-40 367-150	210-120 800-450	375-175 1417-667	600-300 2267-1133	900-450 3400-1700	1200-600 4550-2267	1400-800 5300-3033	2000-1000 7567-3783	2400-1200 9083-4550
1&2		7-4 26.7-15	23-14 86.7-53.3	50-35 190-132	130-90 500-333	230-150 867-567	450-250 1700-950	650-350 2467-1317	900-500 3400-1900	1200-650 4550-2467	1450-800 5483-3033	1800-1000 6817-3783
1,2,&3			11-7 41.7-26.7	27-19 102-71.7	80-60 300-233	160-115 600-433	300-180 1133-683	450-275 1700-1033	600-350 2267-1317	750-450 2750-2083	1000-600 3783-2267	1200-700 4550-2650
1,2,3,&4				17-12 65-45	60-45 233-187	120-90 450-333	230-150 867-567	310-200 1167-750	430-280 1633-1067	550-360 2083-1367	700-450 2650-1700	850-550 3217-2083
1,2,3,4, &5					40-30 152-113	80-85 300-250	135-100 517-383	200-140 750-533	290-200 1100-750	360-250 1367-950	460-325 1733-1233	575-400 2183-1517

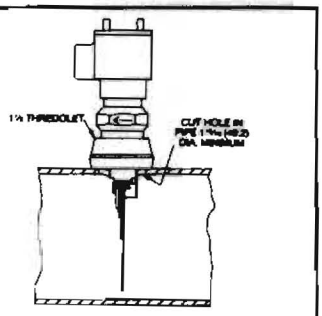
Actuation rates are based on cold water at a specific gravity of 1.0. For fluids of different specific gravity, actuation rates may be approximated by dividing the rate shown by the square root of the specific gravity.

APPROXIMATE ACTUATION/DEACTUATION FLOW RATES FOR AIR.
UPPER FIGURES IN SCFM. LOWER FIGURES IN LPS

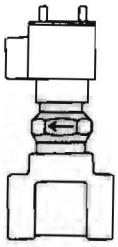
VANE LAYERS	1.5"PIPE	2"PIPE	3"PIPE	4"PIPE	6"PIPE	8"PIPE	10"PIPE	12"PIPE	14"PIPE	16"PIPE	18"PIPE	20"PIPE
1	32-17 15-8	65-32 30-20	210-105 100-50	400-200 190-90	950-475 450-220	1550-650 730-400	2400-1300 1100-600	3450-1900 1600-900	4700-2600 2200-1200	6400-3500 3000-1700	8000-4400 3800-2100	10000-5500 4700-2600
1&2		23-13 10-6	120-70 60-30	195-140 90-70	550-375 260-180	1100-700 520-330	1850-1200 870-570	2700-1750 1300-800	3400-2200 1600-1000	4800-3100 2300-1500	6000-3900 2800-1800	7400-4800 3500-2300
1,2,&3			60-48 30-20	135-100 60-50	375-265 180-130	725-500 340-240	1200-850 570-400	1850-1300 870-610	2600-1800 1200-800	3350-2350 1600-1100	4300-3000 2000-1400	5300-3700 2500-1700
1,2,3,&4				65-50 30-20	260-200 120-90	500-400 240-190	675-700 410-330	1250-1000 590-470	1900-1500 900-710	2500-2000 1200-900	3100-2500 1500-1200	3900-3100 1600-1500
1,2,3,4, &5					130-100 60-50	310-250 150-120	650-525 310-250	1000-800 470-380	1600-1250 760-590	2200-1750 1040-830	2800-2250 1300-1100	3550-2850 1700-1300

Actuation rates are based on air at standard conditions. For gases at other pressures, temperatures, or specific gravities, consult factory for equivalent flow approximations.

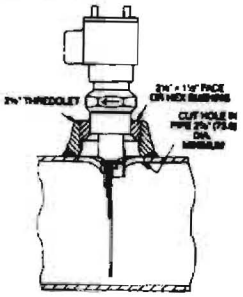
APPLICATION DRAWINGS FOR FLOTECT® AUTOMATIC FLOW SWITCHES



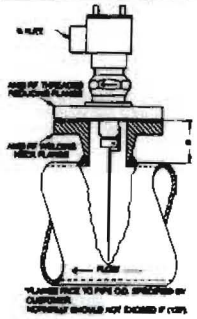
Standard Installation



1-1/2˝ X 1-1/2˝ X 1-1/2˝
Tee Installation

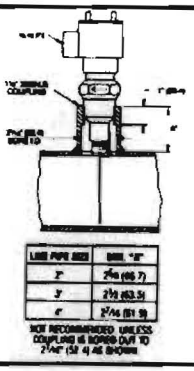


2-1/2˝ Thredolet Installation



Flange Installation

2˝ X 2˝ X 2˝
Tee Installation



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Appendix C: VCP Document Consistency Review Checklist

Site Name: _____ Date of Review: _____
Site No.: _____ Reviewer: _____
Project Mgr.: _____ Volunteer: _____
Work Plan Date: _____ VCA Date: _____

ok?	*Item*	*Notes*
	Technical Components of Voluntary Cleanup Agreement	
☐	▸ Is a signed application on file?	
☐	▸ Is the definition of Contemplated Use consistent with §3.3?	
☐	▸ Is the definition of existing contamination consistent with §3.4?	
☐	▸ Is the definition of the site clear?	
☐	▸ Is the description of the volunteer status clear?	
☐	▸ Has a listing package/deferral been prepared?	
	Investigation Work Plan	
☐	▸ prior site uses described?	
☐	▸ surrounding land uses described?	
☐	▸ adequate to evaluate media, volumes, extent?	
☐	▸ adequate methods of investigation?	
☐	▸ adequate QA/QC?	
☐	▸ source areas defined?	
☐	▸ adequate on & off-site exposure assessment?	
☐	▸ must off-site issues be addressed? adequate?	
☐	▸ need risk assessment?	
☐	▸ adequate documentation/reporting?	
☐	▸ fish & wildlife impact analysis?	
☐	▸ health and safety plan adequate?	

ok?	Item	Notes
☐	▸ CP requirements completed (mailing list, document repository, fact sheet)?	
☐	▸ DOH Project Manager written concurrence?	
☐	▸	
	Investigation Final Report	
☐	▸ Did the investigation substantially comply with the work plan?	
☐	▸ Are any deviations from the work plan sufficiently described?	
☐	▸ Did the investigation adequately define the nature and extent of the contamination and identify source areas?	
☐	▸ Does the report include an on-and off-site exposure assessment?	
☐	▸ Was a DUSR included with the report?	
☐	▸ Has the report been approved by NYSDOH, DFW&MR and other appropriate reviewers?	
☐	▸ Registry status reviewed?	
☐	▸	
	Remedial Action Work Plans	
☐	▸ adequate remedial goals?	
☐	▸ remedy assessed by PE against factors in §375-1.10(c)?	
☐	▸ remedy will mitigate threats on & off-site?	
☐	▸ obvious contamination addressed?	
☐	▸ source control if necessary?	
☐	▸ is the remedy adequately documented (engineering report, PRAP/ROD)?	
☐	▸ adequate O&M?	
☐	▸ adequate site use restrictions?	
☐	▸ adequate post-RA verification and QA/QC?	
☐	▸ adequate worker and community HASPs?	

ok?	*Item*	*Notes*
☐	▸ CP requirements completed (fact sheet, ENB notice, 30-day comment period)?	
☐	▸ does SEQR apply? addressed?	
☐	▸ Concurrence letter from Director DOH BEEI?	
☐	▸	
	Remedial Action Final Report	
☐	▸ Did the remediation substantially comply with the work plan?	
☐	▸ Are any deviations from the work plan sufficiently described?	
☐	▸ Were the remedial goals clearly met?	
☐	▸ Was a DUSR included with the report?	
☐	▸ Was the report certified by a NYS P.E.? Correct language?	
☐	▸ Have we received proof of institutional controls?	
☐	▸ Does the report contain adequate as-builts?	
☐	▸ Does the report contain an adequate OM&M Plan (if applicable)?	
☐	▸ Has the report been approved by NYSDOH, DFW&MR and other appropriate reviewers?	
☐	▸ Registry status reviewed?	
☐	▸ should the definition of existing contamination be revised?	

Appendix D: Guidance on Consistency Review Checklist

The following chart provides additional guidance on completing the Consistency Review Checklist (Appendix C). When completing Appendix C, the reviewer should document in the "Notes" column generally how each requirement below is met.

ok?	*Item*	*Notes*
	Technical Components of Voluntary Cleanup Agreement	
☐	▸ Is a signed application on file?	A complete and signed application must be on file before approving the VCA.
☐	▸ Is the definition of Contemplated Use consistent with §3.3?	Understanding the Contemplated Use is necessary to determine if the investigation/remedy is adequate. Depending upon the contaminants involved and site conditions, it may be necessary to be more specific than generic descriptions (e.g., "industrial/commercial") to evaluate potential exposures or releases to the environment.
☐	▸ Is the definition of existing contamination consistent with §3.4?	Within the limits of available information, the definition should be broad enough to cover everything to be investigated and remediated but not so broad as to be unsupported.
☐	▸ Is the definition of the site clear?	The Volunteer should provide a clear definition of the site boundaries. This is needed both for establishing the scope of the investigation and remediation phases and for defining the extent of contamination. If a Volunteer wishes to obtain a Release for the entire property, the investigation and remediation must address the entire property.
☐	▸ Is the description of the volunteer status clear?	Is the Volunteer a PRP, innocent owner, or innocent non-owner? The status influences the Volunteer's eligibility and their obligations to perform off-site investigations and remediation.
☐	▸ Has a listing package/deferral been prepared?	If enough information exists at this stage to determine that a listing package should be drafted, the procedures in §4.5 should be followed.
	Investigation Work Plans	
☐	▸ Have the prior uses/contamination been described?	The Volunteer should identify the prior uses of the site and any specific processes or chemicals that were used. This greatly assists in developing and confirming the scope of work.
☐	▸ Have the surrounding land uses been described?	This information is needed to support the exposure assessments and the site investigation. It can also influence the types of site use restrictions or controls that may be needed.

ok?	*Item*	*Notes*
☐	▸ Is the scope adequate to define the nature and extent of contamination?	All investigations must contain reliable information that adequately defines the nature and extent of site contamination and, if applicable, threats to fish and wildlife resources.
☐	▸ Are adequate methods of investigation proposed?	The methods used to acquire and handle environmental samples and data must be specified (in SOPs).
☐	▸ Is there adequate QA/QC?	At a minimum, each work plan must address the QA/QC requirements given in Section 2 of the draft DER Technical Guide so that the environmental data acquired during the project will be reproducible, accurate, representative, comparable, and complete.
☐	▸ Have the source areas been defined?	The scope of the investigation must be sufficient to determine if the site contains "source areas" (see §6.4), and if so, to define their extent.
☐	▸ Have on & off-site exposure assessments been performed?	All Volunteers must complete on-site and off-site exposure assessments. The work plan should give enough detail to document that the assessment will adequately characterize all actual/potential public health and environmental exposures due to site contamination.
☐	▸ Have off-site issues been adequately addressed? If not, provide explanation.	Depending upon the Volunteer's status, off-site issues range from completing qualitative exposure assessments to full investigation and remediation. The off-site scope of work must be appropriate for the type of Volunteer and site conditions.
☐	▸ need risk assessment?	If the use of existing cleanup guidance combined with the results of the exposure assessments will not be sufficient to define site-specific remedial goals, a quantitative risk assessment may be needed. The project manager should consult with the appropriate VCP Coordinator and the NYSDOH before a decision is made to complete a risk assessment.
☐	▸ adequate documentation and reporting?	The work plan should specify the information that will be included in the final report to ensure that the information supplied will be sufficient for making remedial decisions.
☐	▸ fish & wildlife impact analysis?	A decision must be made by DFW if a site-specific fish and wildlife impact analysis is needed and if so, if the scope given in the work plan is adequate.
☐	▸ adequate worker HASP?	The Volunteer's consultant is responsible for preparing a worker HASP that meets all regulatory requirements. The Project Manager completes an informal review to determine if the HASP addresses known site issues.

ok?	*Item*	*Notes*
☐	▸ CP requirements completed (mailing list, document repository, fact sheet)?	A fact sheet should be sent to those on the mailing list so that notice of the field work is received at least one week prior to the start of work.
☐	▸ DOH Project Manager written concurrence?	A written concurrence letter (on DOH letterhead) is needed from the DOH Project Manager.
	Investigation Final Report	
☐	▸ Did the investigation substantially comply with the work plan?	This is an overall evaluation of the adequacy of the investigation. If unexpected conditions makes it necessary to do additional work, another work plan should be developed.
☐	▸ Are any deviations from the work plan sufficiently described?	The significance of any omissions or problems should be evaluated to determine if more work is needed.
☐	▸ Did the investigation adequately define the nature and extent of the contamination and identify source areas?	The final report should clearly define the contaminants of concern, impacted media, volumes and limits of contamination, concentration ranges, and additional information as needed to define the nature and extent of contamination.
☐	▸ Does the report include an on-and off-site exposure assessment?	The results of the exposure assessments should be presented with clear conclusions about actual or potentially complete exposure pathways.
☐	▸ Was a DUSR included with the report?	The DUSR must be complete and indicate if the data is useable. Problems with the data must be identified and resolved.
	▸ Has the report been approved by NYSDOH, DFW&MR and other appropriate reviewers?	All reviewers should have had an adequate opportunity to review and comment upon the report. The Project Manager should obtain written approvals from reviewers.
	▸ Registry status reviewed?	The Project Manager must decide if the results of the investigation indicate the need to prepare a deferred listing package or lift an existing deferral.
	Remedial Action Work Plan	
☐	▸ Are there adequate remedial goals?	Unambiguous remedial goals for each media must be specified in the work plan which clearly indicate the cleanup standard to be achieved before a final release could be issued to the Volunteer. The basis and/or source of the cleanup standards must be specified.

ok?	*Item*	*Notes*
☐	▸ Has the remedy been assessed by a PE against the factors listed in §375-1.10(c)?	Although a feasibility study is not required for most VCP sites, the Volunteer must support the proposed remedy by showing how the remedy would achieve the objectives as compared against the evaluation factors in 6 NYCRR Part 375. This should be documented in a report (see §7) that is prepared and sealed by a professional engineer. Class 2 sites must go through the typical PRAP/ROD process.
☐	▸ Will the remedy mitigate threats on & off-site?	The Remedial Action Work Plan should identify the threats posed to public health and the environment and explain how the remedy would mitigate those threats.
☐	▸ Has the obvious contamination been addressed?	Every remedy should halt or prevent significant health and environmental exposures resulting from the release of contaminants.
☐	▸ Is source control necessary?	If source areas exist at the site, in most cases they should be removed or treated rather than contained.
☐	▸ is the remedy adequately documented (engineering report, PRAP/ROD)?	Class 2 sites must go through the normal PRAP/ROD process. Other sites must have an adequate work plan and engineering report.
☐	▸ Is there adequate OM&M?	If the protectiveness of the remedy relies upon continuing OM&M, there must be a plan that specifies the actions, inspections, and reporting that will occur to ensure that the remedy continues to remain protective.
☐	▸ Are there adequate site use restrictions?	If the protectiveness of the remedy depends upon site use restrictions such as groundwater or property use restrictions, they must be clearly identified and placed in an enforceable instrument.
☐	▸ Has adequate post-remediation verification sampling been performed with the appropriate QA/QC?	With some exceptions, post-remediation verification samples are required to demonstrate that the remedial action objectives have been met. Data used to show compliance with the RAOs must be part of a DUSR.
☐	▸ adequate worker and community HASPs?	If the remedy could create exposures to the community, a CHASP must be in place. Documentation air monitoring may be necessary. HASPs must be prepared by a competent person.
☐	▸ CP requirements completed (fact sheet, ENB notice, 30-day comment period)?	The approval letter for the RAWP should not be issued until the citizen participation requirements have been completed. Public meetings are not necessary but may be helpful in some cases.

ok?	*Item*	*Notes*
☐	▸ does SEQR apply? addressed?	SEQR issues must be resolved before the RAWP is approved.
☐	▸ Concurrence letter from Director DOH BEEI?	The DOH concurrence letter from the Director of the BEEI must be in place prior to approval of the RAWP.
	Remedial Action Final Report	
☐	▸ Did the remediation substantially comply with the work plan?	This is an overall evaluation of the completeness of the remedy in comparison to the requirements of the RAWP.
☐	▸ Are any deviations from the work plan sufficiently described?	Any changes from the RAWP must be evaluated by the Project Manager to determine if additional work is necessary.
☐	▸ Were the remedial goals clearly met?	The Report must provide enough information for the Project Manager to determine if the goals have been obtained.
☐	▸ Was a DUSR included with the report?	The DUSR must be complete and indicate if the data is useable. Problems with the data must be identified and resolved.
☐	▸ Was the report certified by a NYS P.E.? Correct language?	The report must be certified by an individual/firm (in compliance with the State Education Law). The certification should include the exact language from §7.3.
☐	▸ Have we received proof of institutional controls?	Evidence that institutional controls are in place must be submitted within 30 days of DEC's approval of the instrument.
☐	▸ Does the report contain adequate as-builts?	The Report should contain as-builts as necessary to document the extent and location of the remedial activities.
☐	▸ Does the report contain an adequate OM&M Plan (if applicable)?	For remedies that include ongoing OM&M, the report should contain a complete and approvable OM&M Plan.
☐	▸ Has the report been approved by NYSDOH, DFW&MR and other appropriate reviewers?	Written concurrence is needed from each reviewer. The NYSDOH signoff comes from the NYSDOH Project Manager.
☐	▸ Registry status reviewed?	The Project Manager must decide if the results of the remediation indicate the need to prepare a deferred listing package or lift an existing deferral.
☐	▸ should the definition of existing contamination be revised?	If the results of the investigation or remediation of the site indicate the need to amend the definition of existing contamination, this should be arranged with the Project Attorney prior to drafting the release letter.