



March 29, 2016

Mr. Alex H. Whitlow, E.I.T.  
Environmental Engineer  
Office of Waste Management and Radiological Protection  
301 E. Louis Glick Highway, Jackson, MI 49201-1556

Re: Violation Notice  
Arbor Hills West Expanded Sanitary Landfill

Dear Mr. Whitlow:

On March 15, 2015, Republic Services, Inc. ("Republic") received a Violation Notice from the MDEQ. The Notice states that the inspection found the Arbor Hills West Expanded Sanitary Landfill in violation of Rule 433(1) (c) relating to the detection of off-site odors and potential nuisance conditions. The Notice required Republic to submit, by March 29, 2016, a response addressing additional corrective action necessary to resolve the odor conditions that existed as of the date of the Notice.

Republic has worked independently and collectively with Advanced Disposal Services, Inc. ("Advanced"), the owner of the landfill, to identify potential odor sources and to address the possible causes of the odors.<sup>1</sup> As documented below, Republic has extensively investigated possible odor sources and worked to solve them, even if there was not a positively identified relationship between the present odors and Republic's efforts. Republic undertook this over-inclusive and aggressive response strategy to get the problem addressed as rapidly and thoroughly as possible with respect to the landfill gas collection system, as that is the only part of the landfill under Republic's control. To date, Republic has completed extensive work at the site, including the expedited installation of 31 new gas collection wells and replacement of 22 wells to improve landfill gas collection efficiency. For its part, we understand that Advanced is, among other things, working to improve soil coverage to address migrating gas and is working on other fronts to manage active waste filling and coverage issues. Republic and Advanced have also been working cooperatively with MDEQ to provide regular reports on our efforts.

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<sup>1</sup> We understand that Advanced is responding separately to the MDEQ Notice. Accordingly, this response will focus on Republic's efforts to address potential odor sources, although we will also note coordinated efforts between the two companies in this response letter.

## **A. Corrective Actions**

The following corrective actions already have been taken:

1. In December 2015, 9 gas extraction wells were replaced as part of routine wellfield maintenance.
2. On January 15, 2016, the leachate collection cleanout risers of Cell 4 were connected to the active gas collection system to provide immediate collection of Cell 4 gas while construction plans were being finalized for additional collection wells.
3. On January 23 and 29, surface scans were completed to identify odor sources.
4. In January, additional soil was placed along the tie in of Cell 4B.
5. On February 1, plans were implemented limiting activities in the compost area.
6. On February 4, a new 75 horsepower air compressor was installed to service the pneumatic pumps located throughout the footprint of the facility.
7. A phone number was set up for neighbors and local residents to call if they detect odors to allow the landfill to investigate expeditiously the source of the odors. The phone number is 248-305-8432 and all calls received are investigated by Advanced and, if shared with us, Republic.
8. Multiple drill crews and pipeline crews were mobilized to the site in response to these conditions. An expedited construction schedule allowed replacement of 18 gas extraction wells and the installation of 24 new gas extraction wells in Arbor Hills West (“AHW”). Work commenced on February 5 and was substantially completed on March 21.
9. On March 8, 5 wells located in the Cell 5 area were investigated for integrity using a camera. The results showed that 4 of the 5 wells were pinched. Also, on March 8 and 9, a surface scan of the entire landfill was performed. Combining the scan information and camera information, immediate action was taken to develop a replacement/construction plan for the 4 pinched wells. In addition, there was enough area at grade to install safely an additional 7 temporary collection wells. This construction plan along with the camera and surface scan results were provided to MDEQ via email to Scott Miller on March 10. Construction of the 7 new gas wells and 4 replacement gas wells began within less than a week of discovery on March 14 and was completed March 22.
10. On March 8, daily surface scanning of the site began. Results were submitted to MDEQ on March 10 and again on March 25, 2016.

### **Ongoing correction actions:**

1. The 53 gas wells recently constructed are being actively adjusted or “tuned” and brought online to their maximum extraction capability. Well tuning is the process of adjusting the gas wells based upon several factors evaluated by the technician such as oxygen, pressure and temperature. When a gas well is new, the vacuum must be increased in a controlled manner to avoid over pulling oxygen into the landfill. This tuning is being accelerated while maintaining prudent efforts to decrease the risk of overpull or other detrimental actions. Wellfield technician efforts have been increased by 30% to accommodate the accelerated tuning of new wells while maintaining the normal operations and maintenance efforts.

2. As discussed with the MDEQ, Republic plans to mobilize and install a 2,000 SCFM candlestick flare at the landfill as an additional prophylactic measure. The flare will further supplement capacity in the event of an unexpected situation where additional flaring could be beneficial for odor control or other reasons. The flare is anticipated to be installed by March 31 and is permit-exempt as confirmed by Diane Kavanaugh-Vetort of the Air Quality Division. After the odor situation is contained, Republic will evaluate the utility of keeping the additional flare on-site.
3. The need for additional gas infrastructure, including new and replacement wells, air lines and/or lateral pipes throughout the entire landfill footprint will be evaluated by April 30.
4. We are continuing to evaluate techniques that could improve well integrity and influence. Typically, wells are not installed until waste is approximately 2 years old. Design is underway to add gas collection capability earlier into the Cell 4 area that is expected to receive waste within the next month.
5. Surface scans are ongoing to identify potential problematic areas to focus improvements in these areas. The frequency will be daily throughout March, twice per week during April and, at a minimum, quarterly for the balance of 2016.
6. The placement of additional soil along the east boundary of Cell 5 will begin this week. Surface scans have identified areas in need of additional cover soil. In the future additional cover soils will be placed over areas that the scans indicate would benefit from the additional cover.
7. The gas collection and control system plan for the site is currently being evaluated and updated to reflect the work that has been completed and the development plan for the collection system moving forward. This plan will be submitted to MDEQ for review by April 30.

## **B. Explanation of Cause of Odors**

There are multiple potential causes of odors at the landfill. These include but are not limited to landfill gas, the types of waste accepted at the facility, the location of waste placement, daily and intermediate cover placement and maintenance, composting operations, the use of compost as a daily cover, and heavy precipitation in 2015 accelerating decomposition. Each of these potential sources is being evaluated and addressed independently by Republic and/or Advanced.

The potential for landfill gas odor has been evaluated with a course of surface scans performed over areas of the landfill with intermediate and final cover during the fourth quarter of 2015 and first quarter of 2016. The results demonstrated that the primary location of landfill gas odors initially appeared to be the north end of AHW, generally comprised of Cell 4. Waste in Cell 4 was initially placed in May 2014 and the west slope of Cell 4 only recently achieved final waste grades. Due to the age of the waste, and the presence of ongoing landfill operations, the landfill gas collection and control system infrastructure had not been installed in this area of the landfill. This work would have been completed in 2016 as part of the routine annual wellfield work because the waste would have been in place 2 years and the well would be located safely outside of the active landfill areas. When gas was detected in this area, a soil plug was placed along the

Cell 4B tie in blocking a potential sand migration pathway. Additionally, the leachate cleanouts running along the base of Cell 4 were connected into the gas collection system and 24 wells were installed in the waste to collect gas from this area. Continuing odors and subsequent surface scans indicated the presence of gas that appeared to be emanating from the Cell 1, 2, and 5 waste mass, which Cell 4 overlays. Collection wells were in place on the north intermediate slope of Cells 1, 2 and 5 and had been raised as they were encountered during waste placement activities following standard operating procedures. Raising wells involves adding extension of solid wall pipe, so these wells have been redrilled to add additional perforations to allow increased gas collection. In addition, 29 new wells have been added in the area of Cells 1, 2 and 5 to increase collection capabilities. Additional cover soil is also being placed along the liner tie-in in this area. Surface monitoring will continue as described above to try to identify any other potential migration pathways.

Wastes accepted at the site include a variety of MSW, industrial and commercial materials. Some of these materials, particularly municipal solid waste and sludges, emit odors that can migrate. Filling operations at the site have been at the Northwest end of the landfill and on exterior slopes. These areas are closer to public transportation routes so odors may be more noticeable. As the active fill area moves into the new Cell 4B, it will be closer to Six Mile Road and the residential areas. Having large or multiple active fill areas increases the potential for odors.

We understand from Advanced that waste material is covered every night with an approved daily cover material. Compost is an approved cover material at Arbor Hills. Although this can work for controlling vectors and wind-blown debris, it is not as effective as soil in minimizing infiltration of stormwater. 2015 was a heavy precipitation year and the increased infiltration may have speeded up the decomposition process and increased odors. Large flat areas or “bowls” where filling is occurring or settlement has occurred also are susceptible to increased stormwater infiltration.

Intermediate cover is applied to portions of the landfill that will not receive waste for 6 months. Typically a 12 inch layer of soil is placed over the daily cover. During the spring, which came very early in 2016, it is common for some erosion to occur to the intermediate cover, which can then present a pathway for gas migration. We understand that cover repairs are currently being addressed by inspections and placement of additional cover soils.

Advanced also operates an active compost facility just north of the landfill that is a possible source of odors. Any disturbance of the composting material has the potential to release odors but an effective operation requires turning of windrows. The material at this site is periodically excavated and moved to the landfill for use as daily cover, potentially releasing odors. This is being addressed by limiting operations to times when the wind direction is away from the nearby residential areas.

Republic and Advanced will continue to investigate and resolve the causes of the odor issues at the site.

### **C. Continuous Perimeter Monitoring for Hydrogen Sulfide and Methane**

Our experience with odor issues at other landfills indicates that continuous perimeter air monitoring is very unlikely to yield helpful information about potential exposures to the surrounding community. Most continuous air monitors for methane and hydrogen sulfide are designed for use in industrial and emergency response situations to warn against acutely hazardous levels of these gases. Such levels do not exist in the odors being experienced, and it is highly unlikely that such conditions will ever occur at the facility fence-line.

Methane disperses rapidly in ambient air and hazardous conditions are extremely unlikely at the landfill fence-line. As with methane, it is highly unlikely that hazardous concentrations of hydrogen sulfide will occur at the facility fence-line or migrate into the surrounding community. This is consistent with statements made by AQD in the February 12, 2016 report, *"Evaluation of Ambient Air Sampling Performed on February 6, 2016 Near Arbor Hills Landfill, Washtenaw County, Michigan."* The results of AQD's air sampling conducted in February would also suggest that periodic perimeter monitoring for VOCs is unlikely to yield results of any benefit.

However, Republic recognizes the concerns of the nearby residents and proposes to develop and implement a sampling strategy to address those concerns. Republic believes that an effective strategy can be developed that does not rely on continuous fence-line monitors. The strategy will focus on those constituents in the landfill gas that are most likely to contribute to odors and are also of potential concern to public health. Many of the constituents in landfill gas are common in ambient air at low concentrations from local and regional sources not related to the landfill. It will be critical to attempt to separate constituents that may be associated with landfill gas from constituents in the local/regional air mass from other sources.

Republic will move quickly to develop a work plan to conduct ambient air monitoring. We would propose to discuss our approach with ADQ in a meeting at the Arbor Hills Landfill office on April 12.

Advanced and Republic are both committed to addressing these issues and returning the site to compliance as soon as possible. As stated above, 53 new and replacement gas wells have been installed and construction was completed on three phases of construction on March 22. Since the beginning of January, we have seen a 25% increase in the gas collection rate. We are continuing to tune the wellfield and monitor the site for any additional areas where additional extraction may be beneficial. We appreciate the concerns and feedback MDEQ has provided and will continue to provide weekly updates on the landfill until the odor issue is abated. If you have any questions, or need further information, do not hesitate to contact Christina Pearse at (734) 231-8217.

Regards,

*Christina Pearse-Bossick 132*

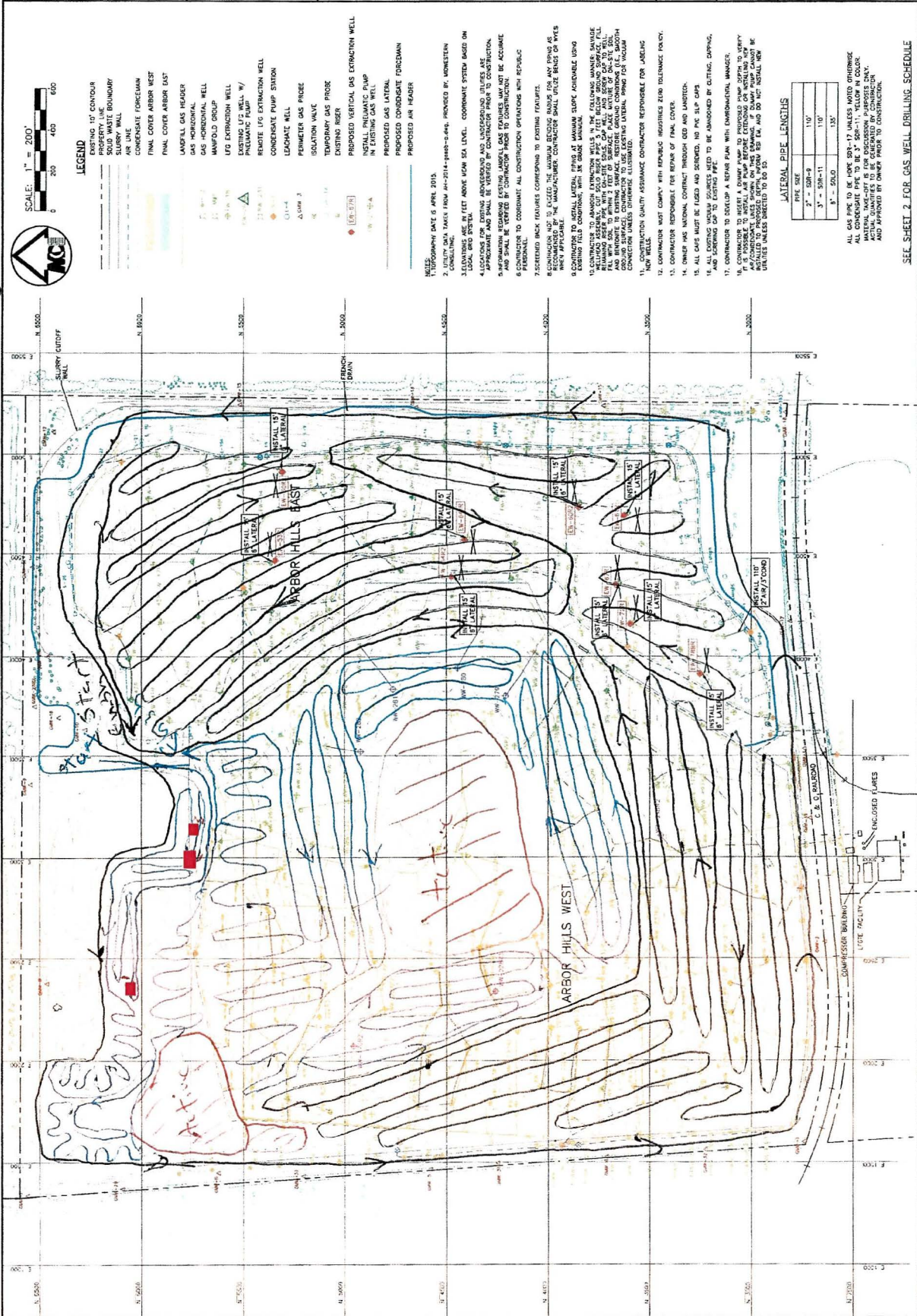
Ms. Christina Pearse-Bossick  
Environmental Manager  
Republic Services, Inc.

Attachments:

First quarter 2016 Surface scan results  
Phase 3 Construction Drawings (Completed)

cc: Mr. Robert Nix, Northville Township Supervisor  
Mr. Daniel Moody, Washtenaw County Division of Environmental Health  
Mr. Lawrencece Bean, MDEQ  
Mr. Scott Miller, MDEQ  
Ms. Diane Kavanaugh Vetort, DEQ  
Ms. Betty LeClerc, Republic  
Mr. Bill Eggleston, Republic  
Mr. Dave Rettel, Advanced  
Mr. Thomas Flanagan, Advanced  
Mr. Jay Warzinski, Advanced  
Mr. Michael Slattery, Advanced  
Ms. Suparna Chakladar, Fortistar

2016 1st QTR SEM 03/08/16  
 Blue 03/09/16 - Black



**SCALE: 1" = 200'**

**LEGEND**

- EXISTING 10' CONTOUR
- PROPERTY LINE
- SOLID WASTE BOUNDARY
- WELL
- AIR LINE
- CONDENSATE FORCEMAIN
- FINAL COVER ARBOR WEST
- FINAL COVER ARBOR EAST
- LANDFILL GAS HEADER
- GAS HORIZONTAL
- WELL
- MANHOLE GROUP
- 10" EXTRACTION WELL
- 10" EXTRACTION WELL W/ PNEUMATIC PUMP
- CONDENSATE PUMP STATION
- LEACHATE WELL
- PERMEATE GAS PROBE
- SOLUTION VALVE
- TEMPORARY GAS PROBE
- EXISTING RISER
- PROPOSED VERTICAL GAS EXTRACTION WELL
- INSTALL PNEUMATIC PUMP
- PROPOSED GAS LATERAL
- PROPOSED CONDENSATE FORCEMAIN
- PROPOSED AIR HEADER

- NOTES:**
1. DRAWING DATE IS APRIL 2015.
  2. EXISTING DATA TAKEN FROM 10-2014-1000-0-048, PROVIDED BY MONSIEUR CONSULTING.
  3. ELEVATIONS ARE IN FEET ABOVE MEAN SEA LEVEL. COORDINATE SYSTEM BASED ON NAD 83.
  4. APPROXIMATE FOR EXISTING PROPOSED AND UNDERGROUND UTILITIES ARE APPROXIMATE AND SHALL BE VERIFIED BY CONTRACTOR PRIOR TO CONSTRUCTION.
  5. SHOWN WITH REGARD TO EXISTING LANDFILL GAS SYSTEMS MAY NOT BE ACCURATE.
  6. CONTRACTOR TO COORDINATE ALL CONSTRUCTION OPERATIONS WITH REPUBLIC PERSONNEL.
  7. SCREENED BACK FEATURES CORRESPONDING TO EXISTING FEATURES.
  8. CONTRACTOR NOT TO BE RESPONSIBLE FOR ANY PIPING AS SHOWN ON THIS DRAWING UNLESS SPECIFICALLY NOTED OTHERWISE.
  9. CONTRACTOR TO INSTALL LATERAL PIPING AT MAXIMUM SLOPE ACHIEVABLE USING WELLHOLE ASSEMBLY, BUT SHALL BE AT LEAST 2 FEET BELOW SURFACE GRADE. ALL LATERALS SHALL BE INSTALLED WITHIN 2 FEET OF SURFACE GRADE. CONTRACTOR SHALL VERIFY ALL LATERAL PIPING IS INSTALLED WITHIN 2 FEET OF SURFACE GRADE. CONTRACTOR SHALL VERIFY ALL LATERAL PIPING IS INSTALLED WITHIN 2 FEET OF SURFACE GRADE.
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  14. CONTRACTOR SHALL VERIFY ALL LATERAL PIPING IS INSTALLED WITHIN 2 FEET OF SURFACE GRADE.
  15. ALL GAS MUST BE LAGED AND SCREENED, NO PVC S-LP GAS.
  16. ALL EXISTING VALVE SOURCES NEEDED TO BE AMOUNDED BY CUTTING, DRAINING, AND BURNING CAP TO EXISTING PIPE.
  17. CONTRACTOR TO DEVELOP A REPORT FROM WITH CONSTRUCTION MANAGER.
  18. IT IS POSSIBLE TO INSTALL AIR PUMP BEFORE EXTENDING OR WITHDRAWING AIR LINES. CONTRACTOR SHALL VERIFY ALL LATERAL PIPING IS INSTALLED WITHIN 2 FEET OF SURFACE GRADE. CONTRACTOR SHALL VERIFY ALL LATERAL PIPING IS INSTALLED WITHIN 2 FEET OF SURFACE GRADE.
  19. CONTRACTOR SHALL VERIFY ALL LATERAL PIPING IS INSTALLED WITHIN 2 FEET OF SURFACE GRADE.
  20. CONTRACTOR SHALL VERIFY ALL LATERAL PIPING IS INSTALLED WITHIN 2 FEET OF SURFACE GRADE.

**LATERAL PIPE LENGTHS**

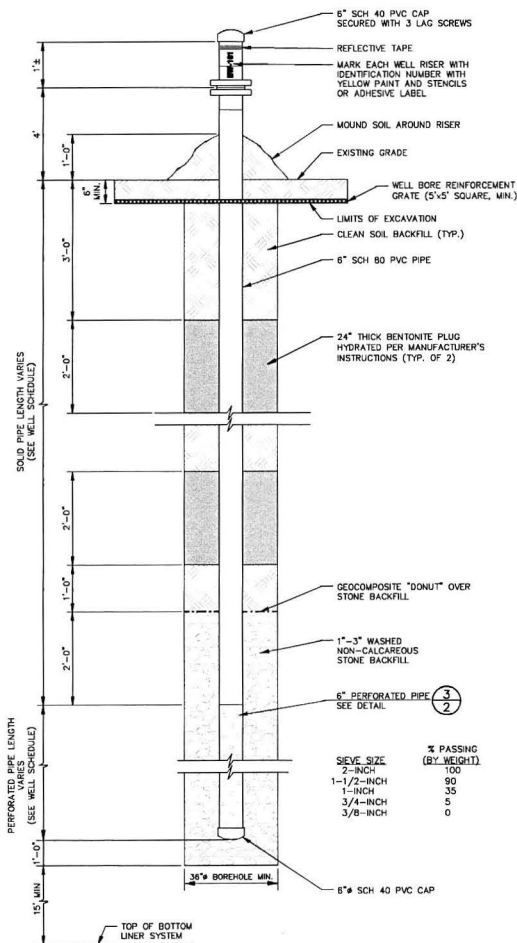
PIPE SIZE	LENGTH
2" - 500'-0"	110'
3" - 500'-11"	110'
4" - 500'-0"	130'

ALL GAS PIPE TO BE INSTALLED WITHIN 2 FEET OF SURFACE GRADE. CONTRACTOR SHALL VERIFY ALL LATERAL PIPING IS INSTALLED WITHIN 2 FEET OF SURFACE GRADE. CONTRACTOR SHALL VERIFY ALL LATERAL PIPING IS INSTALLED WITHIN 2 FEET OF SURFACE GRADE.

SEE SHEET 2 FOR GAS WELL DRILLING SCHEDULE

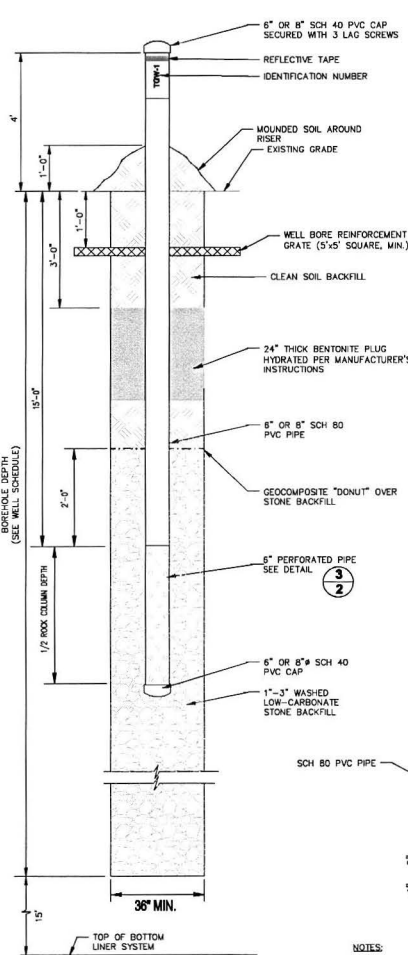




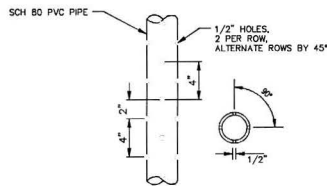


- NOTES:
- CONTRACTOR SHALL SURVEY THE PROPOSED WELL LOCATIONS AND PROVIDE THE EXISTING GROUND SURFACE ELEVATION AT EACH LOCATION TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WELL DRILLING.
  - ENGINEER SHALL ADJUST WELL SCHEDULE AS NECESSARY BASED ON THE PRE-CONSTRUCTION SURVEY.
  - ALL SIGNATURES REQUIRED ON THE FINAL WELL SCHEDULE PRIOR TO COMMENCEMENT OF DRILLING.

**LFG EXTRACTION WELL DETAIL** ①  
NOT TO SCALE

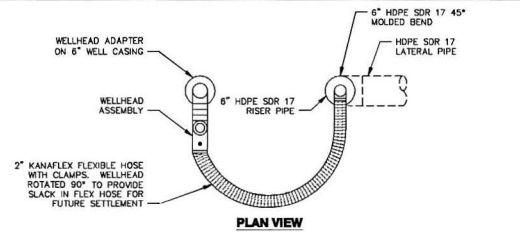


**LFG ROCK COLUMN DETAIL** ②  
NOT TO SCALE

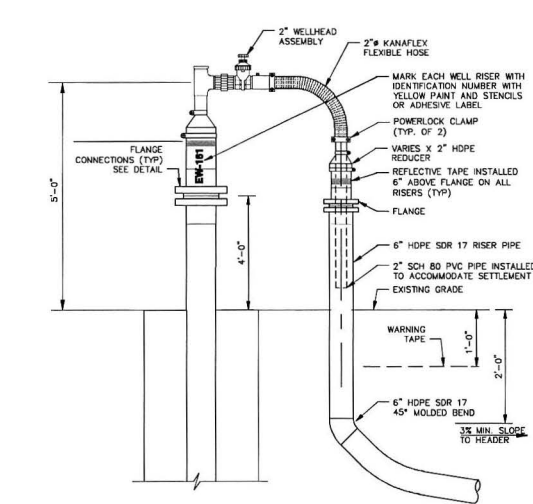


- NOTES:
- PERFORATIONS SPACED 90° APART HORIZONTALLY.
  - PERFORATIONS SPACED 4" APART VERTICALLY.
  - 90° AND 270° ROWS STAGGERED 2" BELOW 0° AND 180° ROWS.

**PERFORATED PIPE DETAIL** ③  
NOT TO SCALE



**WELLHEAD DETAIL** ④  
NOT TO SCALE



**PROPOSED WELL SCHEDULE**

WELL ID	NORTHING	EASTING	ELEVATION (FT)		BOREHOLE DEPTH (FT)	PIPE LENGTH (FT)		THICKNESS OF GRAVEL PACK (FT)		
			GROUND <sup>(1)</sup>	BASE <sup>(2)</sup>		PURCHASED	ABOVE GRADE RISER			
WW-260R	5399	3161	1050	970	115	51	15	3	102	
WW-261R	5449	3441	1051	940	955	41	15	3	83	
WW-264R	5230	3320	1065	930	950	51	15	3	102	
WW-268R	5253	3584	1089	964	979	110	48	15	3	97
WW-109*	5878	1773	1028							
WW-110*	5781	1825	1043							
IGW-113	5559	3187	1016	968	983	33	10	15	3	20
IGW-114	5515	3238	1034	926	941	49	15	3	80	
IGW-115	5072	3179	1012	921	938	24	30	15	3	61
IGW-116*	5738	2847	1049							
IGW-117*	5738	2847	1050							

\* Installation of these wells by others