

Bridgeton Landfill LLC

October 1, 2015

Mr. Chris Nagel
Missouri Department of Natural Resources
Solid Waste Management Program
1738 East Elm Street
Jefferson City, Missouri 65101

Re: RCP Historical Records Review – North Quarry Report
Bridgeton Sanitary Landfill
Permit No. 0118912, St. Louis County

Dear Mr. Nagel

Bridgeton Landfill, LLC (Bridgeton Landfill) provides the attached Reinforced Concrete Pipe (RCP) Historical Records Review – North Quarry Report pursuant to our letter of August 25, 2015, excerpted below:

“Bridgeton Landfill agrees to complete a study identifying all inactive RCP structures in the North Quarry and submit a report of findings by October 1, 2015. The study will identify location, construction details, risk of oxygen intrusion and current state and condition to the degree possible. The study will also provide the information needed to develop a subsequent Work Plan for actions that may be reasonably implemented to maintain current conditions in the North Quarry.”

The attached evaluation identifies two sources of RCPs in the North Quarry: Trench Rock Wells (TRWs) utilized for gas collection and Leachate Collection Wells (LCWs). RCPs were utilized as protective barriers for these points and extended as waste was placed in the vicinity of the structure. In summary, it is recommended not to pursue additional abandonment of these structures at this time.

As discussed in detail in the attached report the TRWs do not extend to the quarry floor and as such are not an anchored structure to the base of the landfill and likely settle with the waste mass. The leachate collection wells, excluding the northernmost LCW Old Collection Well A, are significantly below the ground surface and therefore, not feasible to pursue abandonment. The report indicates LCW Old Collection Well A may be near the surface and significantly away from the reaction area. Furthermore, gas extraction wells in the vicinity of this location have not demonstrated a risk of oxygen intrusion, as outlined further in the attached report.

Locations of RCPs located in the North Quarry were surveyed, staked, and visibly inspected for differential settlement and odors on September 22, 2015 by Weaver Consultant Group. No settlement or odors were observed in any of the RCP locations. Additional abandonment of the RCPs will not be

Bridgeton Landfill LLC

pursued at this time and locations will continue to be visibly inspected for differential settlement, odors, and elevated levels of oxygen in adjacent wells to determine if further evaluation is needed.

Please feel free to call me if you have any questions or comments.



Brian J. Power
Environmental Manager
Bridgeton Landfill, LLC

Attachments:

- Reinforced Concrete Pipe (RCP) Historical Records Review – North Quarry



October 1, 2015

Mr. Brian Power
Environmental Manager
Republic Services, Inc.
13570 St. Charles Rock Road
Bridgeton, MO 63044

Re: Reinforced Concrete Pipe (RCP) Historical Records Review – North Quarry
Bridgeton Landfill
Project No.: 0120-131-10-51

Dear Mr. Power:

Weaver Consultants Group (WCG) has been tasked with evaluating historical permit documents and site information in regards to environmental controls that were constructed with reinforced concrete piping (RCP) within the north quarry portion of the Bridgeton Landfill permitted under Solid Waste Permit# 118906, 118909, and 118912 and determine the need to conduct intrusive work to abandon these structures. This information was obtained from the review of historical files including permit and as-built documents.

During landfill operations of the area known as the North Quarry, some environmental control points were constructed of RCPs that were extended as waste was placed in the vicinity of the structure. Each of the RCPs is no longer in operations and was abandoned sometime prior to 1999. These RCPs were utilized as leachate collection wells (LCW) and gas collection points.

Leachate Collection Wells

The first leachate collection well (LCW) to appear in historical documents was in a drawing entitled "*Miscellaneous Details and Existing Contours*" with a received date by the Missouri Department of Natural Resources (MDNR) on December 26, 1978 (Attachment 1). The LCW is shown at a low point in the quarry near the intersection of St Charles Rock Road and Taussig Road. It is shown at 310 feet above mean sea level (MSL) which is consistent with the approximate bottom elevation of the quarry. Shortly after this drawing was submitted, the MDNR issued Solid Waste Permit# 118906 (Attachment 3) on January 25, 1979 to authorize disposal of municipal solid waste in approximately 13 acres of the open pit limestone quarry, also known as the North Quarry. It was unclear at the issuance of the permit the specifications of the LCW and no as-built documentation for this LCW could be located during the review. Attachment 2 includes a letter dated November 6, 1981 from Reitz & Jens, Inc. to William Canney identifying the LCW as an "old 48-inch RCP collection well in the old landfill area at St. Charles Rock Road and Taussig Road."

On August 21, 1981 the MDNR issued Solid Waste Permit# 118909 (Attachment 4) for a landfill expansion of approximately 3 acres into the quarry pit just south of the previously permitted area under Permit# 118906. The expansion area of the quarry pit included what was then known as Black Diamond Lake which was used as a leachate collection pond. Condition #2 in Permit# 118909 required the removal of the liquids from the quarry pit into the newly constructed temporary holding lagoon located southwest of the quarry property. In order to maintain reasonable levels of liquid in the new quarry pit, the MDNR also required the installation of a leachate collection well in the quarry pit.

The permit condition goes on to state that “the collection well and pump to the west of the rock wall separating the old (Permit# 118906) and new (Permit# 118909) landfill pits shall be operated such that leachate is maintained at the lowest practicable level.” This LCW was used in conjunction with the first to control liquid levels in the area covered under Permit# 118906. No other documentation or as-built drawings could be located during the review.

Locations of these three LCWs are shown on the Attachment 5 - Drawing entitled “*West Lake Landfill Inc. Topographical Map*” prepared by Reitz & Jens, Inc. The original LCW located near the intersection of St. Charles Rock Road and Taussig Road is documented as “Old Collection Well.” The collection well required by Permit# 118909 located in the quarry pit is identified as “New Collection Well.” The collection well to the west of the rock wall separating the new and old landfill pits documented in Permit# 118909 is consistent with the location identified as “Replacement Collection Well.” The specifications of the New and Replacement LCWs were unclear at the time of permit issuance and no as-built documentation was found during the review.

Historical groundwater reports from Reitz & Jens, Inc. document the locations and groundwater elevations of the LCWs (Attachment 6). A table in one of the groundwater reports outlines the various collection wells located on site. A groundwater contours drawing associated with the groundwater elevations table is also included (Attachment 7). The drawing has collection wells consistent with the locations in previous drawings.

The groundwater elevations table also identifies the size of the collection wells. Collection Well “A” is identified as a 48” RCP which is consistent with the 1981 Reitz & Jens, Inc. letter to William Canney. Collection well “D” is identified as a 24” RCP, which is consistent with the replacement collection well location from the 1981 “*West Lake Landfill, Inc. Topographical Map*” drawing. The location of Collection Well “E” is consistent with the new collection well identified in the 1981 “*West Lake Landfill, Inc. Topographical Map*” drawing but is listed as 12” PVC in the groundwater elevations table. No record of extending Collection Well “E” with a protective RCP was found during the review. The groundwater elevations specified in Attachment 7 table were determined to be erroneous since the top of pipe elevation provided for Collection Well “D” was significantly above ground elevation in 1979 as well significantly higher than the elevation provided at adjacent Collection Well “E”.

During the review, no documentation or as-builts on the top of RCP elevation for the LCWs was located. It is unknown whether additional sections of RCP were added to the collection wells

during landfill operations. There was also no documentation of abandonment of the collection wells found during the review. For the sake of estimating the approximate top of RCP elevation, the locations of the LCWs were referenced onto an aerial survey or drawing following the abandonment excluding Collection Well "A". This area of the landfill ceased accepting waste prior to May 27, 1984. It is presumed Collection Well "A" was abandoned and is near the surface. See Table 1 and the summary below for top of RCP elevations and further discussion.

Also noted in the Groundwater Elevations Table is the identification of Collection Wells "B" and "C". Collection Well "B" is identified as a 48" RCP and "C" is identified as a 24" RCP. According to the Groundwater Elevations Drawing in Attachment 6, Collection Well "B" and "C" were located outside of the Permit# 118912 permitted boundary and as such not addressed in this report.

As part of the Solid Waste Permit# 118912 (Attachment 8) issued on November 6, 1985, Burns and McDonnell prepared a drawing entitled "*West Lake Landfill, Inc. Sanitary Landfill Expansion*" that outlined the environmental controls in the South Quarry. The drawing, included as Attachment 9, shows the location of a LCW in the North Quarry near the historical locations of the previous LCW in that area. However, the drawing does not show the New Collection Well or Replacement Collection Well associated with the 1981 "*West Lake Landfill, Inc. Topographical Map*" drawing. The drawing shows significant filling in the areas of these collection wells. It is presumed that the New Collection Well "E" and Replacement Collection Well "D" were not protruding from the surface at this time and the extending of the RCPs had ceased prior to this drawing. The estimated abandonment date is presumed to have occurred prior to the 1985 Burns and McDonnell drawing. The monthly leachate sump measurements reports to comply with Condition 6.D. and E. outlined in November 18, 1985 permit (Attachment 8) were reviewed to determine the date of abandonment. However, monthly reports prior to October 1991 were unavailable. According to the Leachate Sump Measurements and Analytical Data report prepared by Environmental Analysis, Inc. in October 1991 (Attachment 13), the LCWs previously discussed were not sampled, nor were the LCWs sampled after this report based on a review of monthly reports and therefore abandoned by this time. This supports that the wells were not operational as far back as 1991.

The approximate elevations of the collection wells are presented in the table below along with the current ground surface elevations to get an approximated depth to the top of pipes. The elevations are approximate and were found given the available information.

Table 1: LCW RCP Summary Table

| Collection Well Identification ¹ | Size/Material | Approx. Location (Northing) ³ | Approx Location (Easting) ³ | Installation Date | Abandonment Date | Approx. Top of Pipe ² (ft) | Approx. Elevation at 2005 Final Cover Installation (ft) | Surveyed Ground Elevation 9/22/2015 (MSL) | Approx. Settlement b/t 2005 & 2015 (ft) | Estimated Depth to top of RCP (ft bgs) |
|---|---------------|--|--|-------------------|--------------------|---------------------------------------|---|---|---|--|
| Old Collection Well/"A" | 48" RCP | 1068977.68 | 516776.76 | 1979 | <1985 | near surface | 470.0 | 471.3 | NA ⁴ | near surface |
| Replacement Collection Well/"D" | 24" RCP | 1068469.78 | 516420.94 | 1981 | <1991 ³ | 450.0 | 524.7 | 516.4 | 8.3 | 66.4 |
| New Collection Well/"E" | 12" PVC | 1068393.87 | 516541.21 | 1981 | <1991 ³ | 456.0 | 509.0 | 499.3 | 9.7 | 43.3 |

¹Identification from "West Lake Landfill Inc. Topographical Map" by Reitz & Jens, Inc. (see Attachment 5)
²Elevation taken from closest aerial survey to approximate time of abandonment. For "D" and "E" the 1992 Gas Collection System Plan (Attachment 14) surface was used to estimate elevation. For "A" the 1981 drawing in Attachment 5 was used, could be very close to surface.
³No liquid levels were measured for these wells in the 1991 Leachate Sump Measurements and Analytical Data report (see Attachment 13). It is assumed they were abandoned prior to this report.
⁴This well was at a low point in the North Quarry that often held water. Clean fill may have been placed in this area between 2005 & 2015 to prevent ponding

In summary the total number of LCWs located in the North Quarry was determined to be three as follows:

- Old Collection Well/Collection Well "A": near the intersection of St. Charles Rock Road and Taussig Road consisting of a 48-inch RCP. This area ceased accepting waste prior to May 27, 1984 and minimal if any additional waste was placed since 1981. It is presumed that this collection well is at or near the landfill surface. This area is located outside of Permit# 118912.

This location was surveyed, staked and visibly inspected for differential settlement and odors on September 22, 2015 by WCG staff. No settlement or odors were observed in the area of the surveyed location. Over the past year, minimal elevations in oxygen have been observed. Table 2 below shows the oxygen monitoring statistics for gas extraction wells located within 300 feet of the LCW from September 9, 2014 to September 9, 2015. It is recommended to visibly inspect the area of the staked location quarterly in coordination with the quarterly SEM scan, and to monitor oxygen levels in wells during routine NSPS monitoring events.

Table 2: Oxygen Statistics for Old Collection Well/Collection Well "A"

| Well ID ¹ | # of samples | Average O2 % | Min O2% | Max O2% | # of exceedances ² |
|----------------------|--------------|--------------|---------|---------|-------------------------------|
| GEW-46R | 75 | 0.00 | 0.0 | 0.2 | 0 |
| GEW-01 | 2 | 0.00 | 0.0 | 0.0 | 0 |
| GEW-02 | 91 | 0.02 | 0.0 | 0.6 | 0 |
| GEW-03 | 92 | 0.02 | 0.0 | 0.6 | 0 |
| PGW-60 ³ | 69 | 1.66 | 0.0 | 13.8 | 3 |

¹Only NSPS locations taken into consideration

²According to NSPS, exceedance is considered greater than 5% O₂

³This location consists of an 8-inch diameter drill hole intended to be installed outside waste to address gas migration. However the PGW was drilled in waste and has frequently experienced elevated liquid levels resulting in minimal to no flow and elevated oxygen due to leaks in well head infrastructure.

- Replacement Collection Well/Collection Well “D”: the LCW consists of a 24” RCP replacement collection well. This well was located on top of the quarry shelf. This well was abandoned some time prior to October 1991. No sampling of this well was located reviewing monthly reports between October 1991 and 1996. The 1992 Gas Collection System Plan in Attachment 14 shows a landfill surface as of 1992 (or earlier) after the well was abandoned. The highest elevation possible for the RCP on this well can be taken from the approximate location of the well on the 1992 surface, which is approximately 450 feet above sea level as shown in Table 1. This is an extremely conservative estimate and is likely deeper into the landfill. The survey elevation on September 22, 2015 was 516.4 feet above sea level at the estimated location of the RCP. It is estimated that the RCP is at least 66.4 feet below ground surface.

This location was surveyed, staked and visibly inspected for differential settlement and odors on September 22, 2015 by WCG staff. No settlement or odors were observed. Over the past year, no elevations in oxygen have been observed. Table 3 below shows the oxygen monitoring statistics for gas extraction wells located within 300 feet of the LCW from September 9, 2014 to September 9, 2015. It is recommended to visibly inspect this location quarterly in coordination with the quarterly SEM scan, and to monitor oxygen levels in wells during routine NSPS monitoring events.

Table 3: Oxygen Statistics for Replacement Well/Collection Well “D”

| Well ID ¹ | # of samples | Average O ₂ % | Min O ₂ % | Max O ₂ % | # of exceedances ² |
|----------------------|--------------|--------------------------|----------------------|----------------------|-------------------------------|
| GEW-43R | 89 | 0.06 | 0.0 | 1.8 | 0 |
| GEW-45R | 61 | 0.01 | 0.0 | 0.1 | 0 |
| GEW-47R | 80 | 0.16 | 0.0 | 0.9 | 0 |
| GEW-06 | 71 | 0.00 | 0.0 | 0.1 | 0 |
| GEW-44 | 59 | 0.06 | 0.0 | 3.2 | 0 |
| GEW-48 | 72 | 0.00 | 0.0 | 0.1 | 0 |
| GEW-49 | 80 | 0.07 | 0.0 | 1.0 | 0 |
| GEW-50 | 65 | 0.08 | 0.0 | 3.9 | 0 |
| GEW-51 | 63 | 0.01 | 0.0 | 0.2 | 0 |
| GEW-52 | 67 | 0.01 | 0.0 | 0.2 | 0 |
| GEW-53 | 98 | 0.01 | 0.0 | 0.3 | 0 |

¹Only NSPS locations taken into consideration

²According to NSPS, exceedance is considered greater than 5% O₂

- New Collection Well/Collection Well “E”: the LCW near the quarry pit located to the west of the rock wall separating the new and old landfill pits consisting of a 12-inch PVC. It is recommended to not pursue additional abandonment of this extraction point. Records indicate (See Attachment 7) construction consists of a 12-inch PVC pipe and no records indicate that a RCP was used as a protective casing. Furthermore, it is estimated the PVC is at least 43.3 feet below ground surface

This location was surveyed, staked and visibly inspected for differential settlement and odors on September 22, 2015 by WCG staff. No settlement or odors were observed. Over the past year, no elevations in oxygen have been observed. Table 4 below shows the oxygen monitoring statistics for gas extraction wells located within 300 feet of the LCW from September 9, 2014 to September 9, 2015.

Table 4: Oxygen Statistics for New Collection Well/Collection Well “E”

| Well ID ¹ | # of samples | Average O2 % | Min O2% | Max O2% | # of exceedances ² |
|----------------------|--------------|--------------|---------|---------|-------------------------------|
| GEW-042R | 59 | 0.01 | 0 | 0.4 | 0 |
| GEW-043R | 89 | 0.06 | 0 | 1.8 | 0 |
| GEW-046R | 75 | 0.00 | 0 | 0.2 | 0 |
| GEW-044 | 59 | 0.06 | 0 | 3.2 | 0 |
| GEW-051 | 63 | 0.01 | 0 | 0.2 | 0 |
| GEW-052 | 67 | 0.01 | 0 | 0.2 | 0 |
| GEW-053 | 98 | 0.01 | 0 | 0.3 | 0 |
| GEW-054 | 113 | 0.01 | 0 | 0.3 | 0 |

¹Only NSPS locations taken into consideration

²According to NSPS, exceedance is considered greater than 5% O2

A permit modification for the upgrade of the leachate collection system was approved in 1996. The permit modification included the installation of six leachate collection sumps (LCS-1 through LCS-6). Within the south quarry there were four (LCS-1 through LCS-4) and within the north quarry there were two (LCS-5 and LCS-6). Since LCS-5 and LCS-6 were installed in the North Quarry, where waste was already in-place, these collection sumps were drilled and therefore protective RCPs were not used. A detail and initial locations of LCS-5 and LCS-6 is shown on the 1996 Bridgeton Landfill drawing entitled “*Leachate Collection System & Details*” prepared by Midwest Environmental Consultants and can be found in Attachment 10.

To maintain compliance with Permit Condition outlined in Section 6.D. of the 1985 permit, replacement LCSs were installed when the prior LCSs were rendered ineffective for leachate removal. Each sump replacement was labeled with the same number and labeled alphanumerically (i.e. the third replacement leachate collection sump in the vicinity of LCS-3 is LCS-3C). The most recent leachate collection sumps in the North Quarry are as follows: LCS-5A and LCS-6B. The replacement sumps in the North Quarry were drilled and no protective RCPs were used. It is recommended that no further action is needed for these locations.

Gas Collection

Trench Rock Wells (TRWs) were installed in late 1992/early 1993 and were documented in the record construction drawings entitled *"Gas Collection System Bridgeton Sanitary Landfill"* prepared by Waste Energy Technology (Attachment 11). The TRWs consisted of a riser well encapsulated with a reinforced concrete pipe (RCP) with an inside diameter of 60" with a wall thickness of 9.5". Trenches were installed to initiate gas collection within the area known as the "wet weather area" within the North Quarry. The trenches were designed to allow the removal of LFG while allowing further filling to occur. Each RCP was extended as filling progressed. Additional gas trenches were installed with the progression of filling. Vacuum was applied to the trenches via the TRWs and routed to the flare for destruction. The TRWs were installed with a 36-inch well bore and were not drilled to the base of the landfill. The RCPs were installed at grade over the drilled rock well and extended in sections as waste was placed.

The 1998 drawings prepared by Midwest Environmental Consultants (MEC) depict the existing gas control system with the TRWs in-place (Attachment 12). The 1998 drawings proposed an interim gas control system which excluded the use of the TRWs. There is no documentation on abandonment, however the interim system as outlined on Sheet 3 of the 1998 MEC drawings was implemented in the December 1998 and the TRWs are presumed to be abandoned with this construction event.

According to the as built drawings in *"Gas Collection System Bridgeton Sanitary Landfill"* the top of the TRWs at mean sea level (MSL) ranges from approximately 403.26 feet to 455.67 feet. This was the elevation at which the RCPs were installed. The RCPs were extended up as filling progressed until the TRWs were abandoned after the gas system was upgraded in 1998. Based on available information the 1999 aerial was used to estimate the elevation of the RCPs at abandonment. The approximate elevations and depth to the RCPs can be found in Table 5. The September 22, 2015 survey estimates the ground surface of the TRW locations are from approximately 500 feet to 516 feet above sea level. This indicates that the estimated depth to the RCP encapsulated TRWs ranges from approximately 37 feet to 53 feet below ground surface.

According to the as-built drawings in *"Gas Collection System Bridgeton Sanitary Landfill"* the TRWs were drilled 30 feet in depth. RCPs were installed on top of the TRW and extended to continue active gas collection while waste placement was ongoing. The base of the RCP location is the ground surface as-built elevation. This as-built elevation was compared to the bottom contours of the landfill at each location to determine the separation between the base of the landfill and the RCP. The elevations of the quarry floor at the TRW locations ranged from 240 feet to 368 feet.

Given this information, the bottom of the RCP at each TRW is at least 70 feet from the quarry floor and suspended in waste. See Table 5 below for information on depths and elevations. It is recommended not to pursue additional abandonment of the TRW locations. These extraction points are not located at the base of the landfill and the RCP structure, at a minimum, is 70 feet

above the bottom of the landfill at the point of installation. Furthermore, estimated depth to each of these locations is no less than 37 feet.

The TRW locations were surveyed, staked and visibly inspected for differential settlement and odors on September 22, 2015 by WCG staff. No settlement or odors were observed. Based on the staked locations TRW-8 was located under the current EVOH liner and TRW-7 was located right next to the liner on an access road.

Table 5: TRW RCP Summary Table

| Extraction Point | Installation Date | Initial Abandonment | Most Current As-Built Location (Northing) | Most Current As-Built Location (Easting) | As-Built RCP Elevation ⁴ 1993 (MSL) | Approx 1999 Ground Elevation ¹ (MSL) | Approx 2005 Ground Elevation ² (MSL) | Surveyed Ground Elevation 9/22/2015 (MSL) | Settlement from 2005 to 2015 ³ (ft) | Estimated depth to top of RCP (ft bgs) | Quarry base elevation (MSL) | Distance RCP from Quarry base (ft) |
|------------------|----------------------|---------------------|---|--|--|---|---|---|--|--|-----------------------------|------------------------------------|
| TRW-1 | Late 1992/Early 1993 | December 1998 | 1068405.31 | 516521.77 | 455.67 | 461.9 | 511.95 | 504.03 | 7.92 | 42.13 | 277.46 | 178.21 |
| TRW-2 | Late 1992/Early 1993 | December 1998 | 1068275.60 | 516614.18 | 450.97 | 460.0 | 525.7 | 500.4 | 25.3 | 40.4 | 240 | 210.97 |
| TRW-3 | Late 1992/Early 1993 | December 1998 | 1068144.96 | 516706.65 | 442.69 | 462.1 | 516.56 | 499.7 | 16.86 | 37.6 | 240 | 202.69 |
| TRW-4 | Late 1992/Early 1993 | December 1998 | 1068340.68 | 516445.64 | 451.09 | 463.0 | 514.16 | 515.74 | -1.58 | 52.74 | 348.45 | 102.64 |
| TRW-5 | Late 1992/Early 1993 | December 1998 | 1068211.08 | 516538.34 | 440.32 | 461.5 | 524.31 | 510.36 | 13.95 | 48.86 | 240 | 200.32 |
| TRW-6 | Late 1992/Early 1993 | December 1998 | 1068057.64 | 516582.16 | 441.56 | 460.5 | 516.09 | 502.24 | 13.85 | 41.74 | 240 | 201.56 |
| TRW-7 | Late 1992/Early 1993 | December 1998 | 1068210.61 | 516293.76 | 438.79 | 455.0 | 513.27 | 505.05 | 8.22 | 50.05 | 368.25 | 70.54 |
| TRW-8 | Late 1992/Early 1993 | December 1998 | 1068079.02 | 516387.56 | 426.18 | 460.0 | 518.18 | 502.75 | 15.43 | 42.75 | 240 | 186.18 |
| TRW-9 | Late 1992/Early 1993 | December 1998 | 1067967.40 | 516465.22 | 403.26 | 462.4 | 514.23 | 499.84 | 14.39 | 37.44 | 240 | 163.26 |

¹Time at which TRWs were initially abandoned after gas system expansion was complete in December 1998, no RCPs added after this date

²Elevation after final cover had been applied

³Gravel or clean fill has been added on top of the landfill at TRW-1, TRW-4, and TRW-7 which counteracts settlement value

⁴Top elevation at which first RCP was installed. RCPs were then added on top as filling continued.

Collection Drains

The 1985 drawing entitled “West Lake Landfill, Inc. Sanitary Landfill Expansion, Original Contours and Initial Construction” prepared by Burns & McDonnell (Attachment 9) shows Collection Drains (CD-1 through CD-20) at locations on the perimeter of the permitted landfill included a few in the North Quarry. Throughout the review of historical documents, no as-built drawings or record of operations of these collection drains were located. It is presumed these collection points were not installed.

Summary and Conclusions

Based on comparison of the historical as-built documentation and various historical correspondences, most RCPs are located deep within the landfill with the exception of Old Collection Well/Collection Well “A” which may be located near the surface. The other LCW RCP, Replacement Collection Well/Collection Well “D”, is around 66.4 feet or more below ground surface. The closest TRW RCP to the surface is approximately 37.4 feet below ground surface, while the deepest is approximately 52.7 feet below ground surface. All TRWs are anywhere from 70 feet to 211 feet above the base of the quarry floor. Oxygen levels around all RCP locations have been stable and minimal.

The visual survey conducted by WCG staff on September 22, 2015 revealed no unknown infrastructure, no odors and no differential settlement in the vicinity of the staked RCP locations within the North Quarry. The RCP locations have shown no visible influence on the surface of


the landfill or elevated oxygen levels in nearby extraction wells. It is recommended to not pursue further abandonment of the RCPs given the possible depth to the structures and lack of impact the locations have had on oxygen intrusion and settlement. The LCW RCP locations will continue to be visibly inspected for differential settlement and odors while all locations will be monitored for elevated levels of oxygen in adjacent wells to determine if further evaluation is needed.

The historical RCP investigation and visual survey of the RCP locations has determined that a work plan for additional abandonment of the RCPs is not needed at this time. The approximate locations of the RCPs are shown in Attachment 15.

Sincerely,

Weaver Consultants Group, LLC

Michele Clark
Senior Project Director



Attachments:

Attachment 1 – 1978 drawing entitled “*Miscellaneous Details and Existing Contours*” prepared by Paul H. Himebaugh

Attachment 2 – 1981 Letter prepared by Reitz & Jens, Inc. entitled “*Re: New Collection Well for Landfill Expansion Area*”

Attachment 3 – Solid Waste Disposal Area Operating Permit# 118906

Attachment 4 – Solid Waste Disposal Area Operating Permit# 118909

Attachment 5 – 1981 drawing entitled “*West Lake Landfill, Inc. Topographical Map*” prepared by Reitz & Jens, Inc.

Attachment 6 – Groundwater Elevations Drawing prepared by Reitz & Jens, Inc.

Attachment 7 – Groundwater Elevations Table prepared by Reitz & Jens, Inc.

Attachment 8 – Solid Waste Disposal Area Operating Permit# 118912

Attachment 9 – 1985 drawing entitled “*West Lake Landfill, Inc. Sanitary Landfill Expansion, Original Contours and Initial Construction*” prepared by Burns & McDonnell

Attachment 10 – 1996 drawing entitled “*Leachate Collection System & Details*” prepared by Midwest Environmental Consultants

Attachment 11 – 1993 drawings entitled “*Gas Collection System Bridgeton Sanitary Landfill*” prepared by Waste Energy Technology

Attachment 12 – 1998 drawings entitled “*Bridgeton Landfill, LLC Landfill Gas Recovery System and Leachate Forcemain*” prepared by Midwest Environmental Consultants

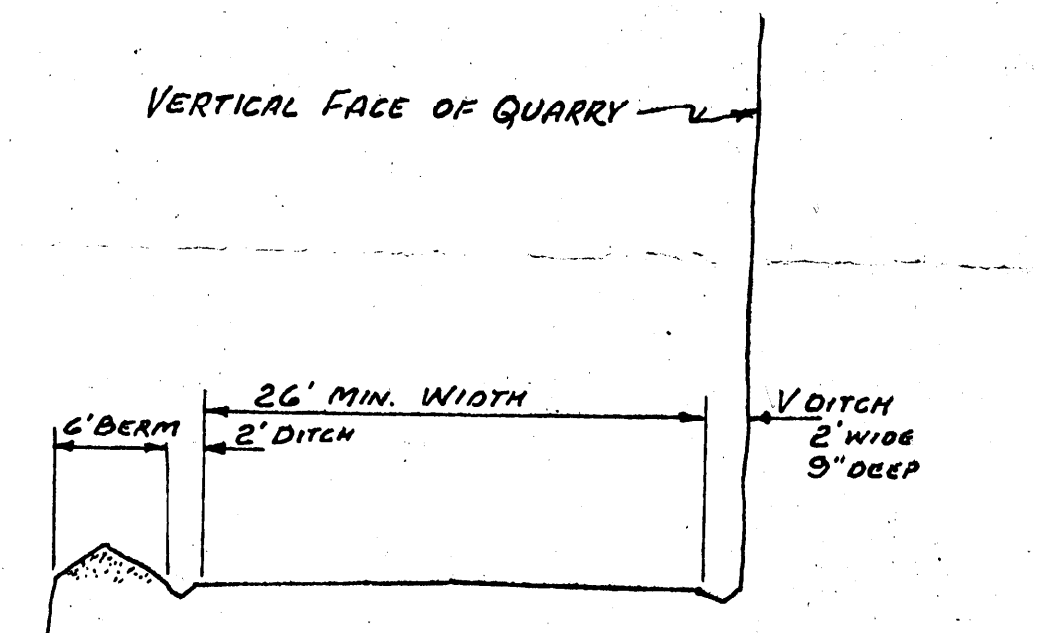
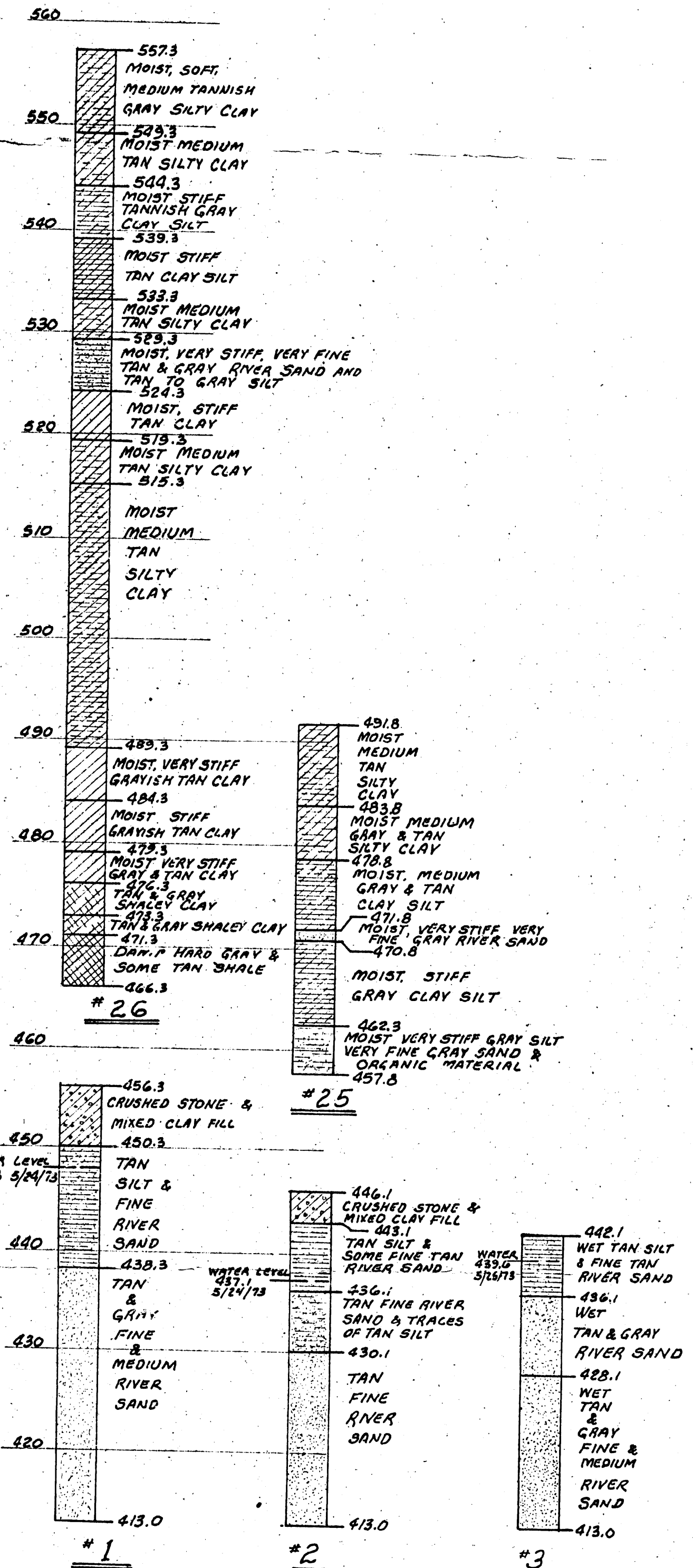
Attachment 13 – 1991 Leachate Sump Measurements and Analytical Data report prepared by Environmental Analysis, Inc.

Attachment 14 – 1992 drawing entitled “*Gas Collection System Plan*” prepared by Laidlaw Technologies, Inc.

Attachment 15 – RCP location Figure

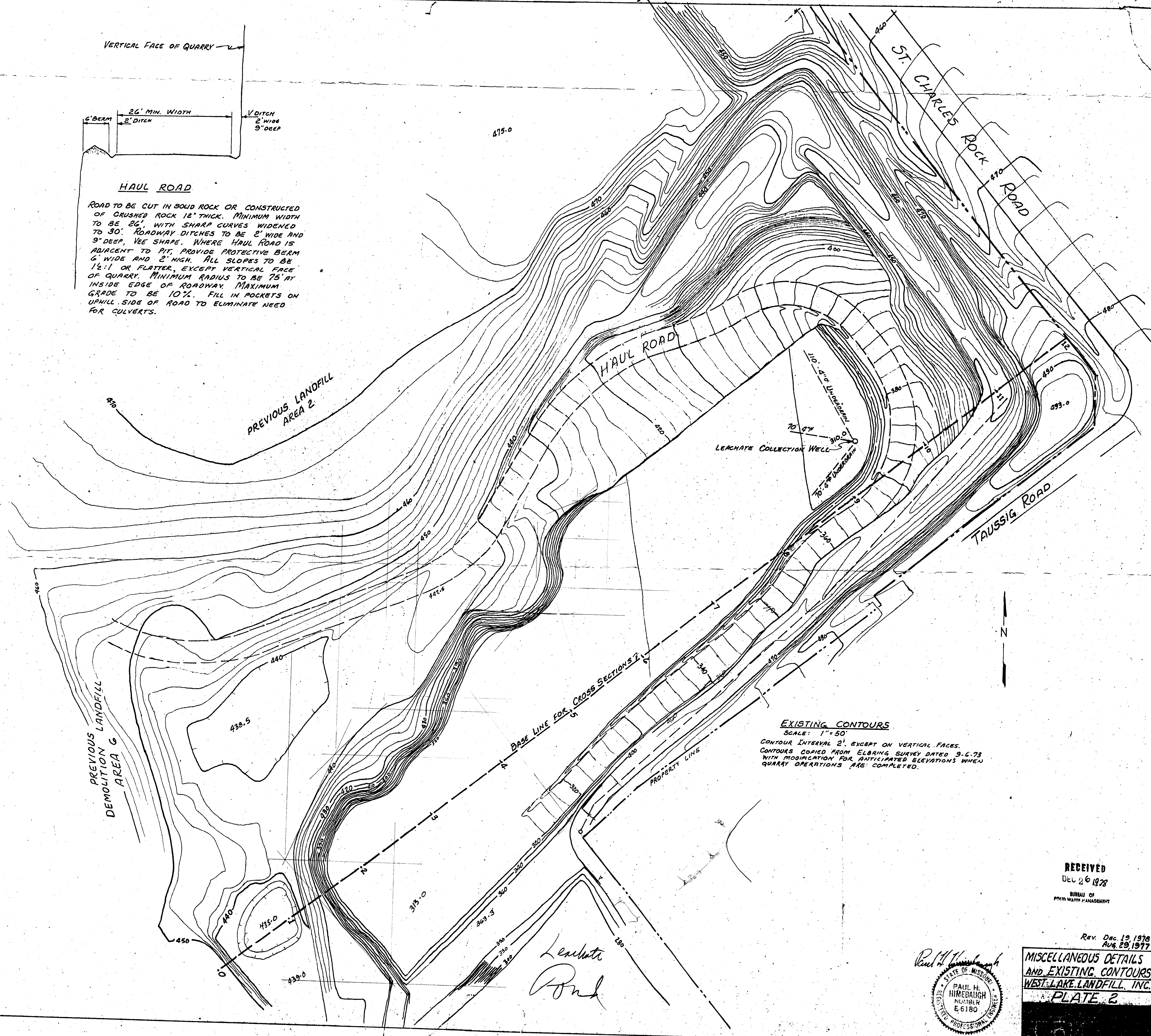
Attachment 1

1978 drawing entitled "*Miscellaneous Details and Existing Contours*" prepared by Paul H. Himebaugh



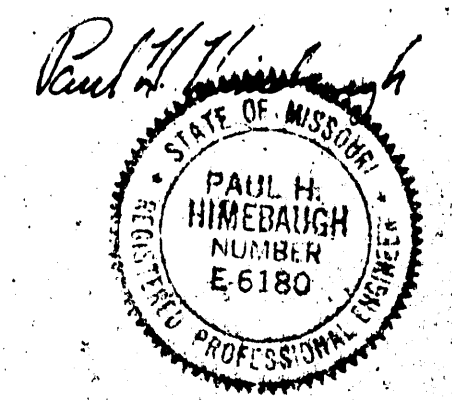
HAUL ROAD

ROAD TO BE CUT IN SOLID ROCK OR CONSTRUCTED OF CRUSHED ROCK 12" THICK. MINIMUM WIDTH TO BE 26' WITH SHARP CURVES WIDENED TO 30'. ROADWAY DITCHES TO BE 2' WIDE AND 9" DEEP, VEE SHAPE. WHERE HAUL ROAD IS ADJACENT TO PIT, PROVIDE PROTECTIVE BERM 6' WIDE AND 2' HIGH. ALL SLOPES TO BE 1 1/2:1 OR FLATTER, EXCEPT VERTICAL FACE OF QUARRY. MINIMUM RADIUS TO BE 75' AT INSIDE EDGE OF ROADWAY. MAXIMUM GRADE TO BE 10%. FILL IN POCKETS ON UPHILL SIDE OF ROAD TO ELIMINATE NEED FOR CULVERTS.



EXISTING CONTOURS
SCALE: 1"=50'
CONTOUR INTERVAL 2', EXCEPT ON VERTICAL FACES.
CONTOURS COPIED FROM ELBORING SURVEY DATED 9-6-73 WITH MODIFICATION FOR ANTICIPATED ELEVATIONS WHEN QUARRY OPERATIONS ARE COMPLETED.

RECEIVED
DEC 26 1978
BUREAU OF
PUB. WORKS MANAGEMENT



Rev. Dec. 19, 1978
Aug. 29, 1977

MISCELLANEOUS DETAILS
AND EXISTING CONTOURS
WEST LAKE LANDFILL, INC.
PLATE 2

Attachment 2

**1981 Letter prepared by Reitz & Jens, Inc. entitled "*Re: New Collection Well for Landfill
Expansion Area*"**

CONSULTING ENGINEERS

November 6, 1981

Mr. William Canney
West Lake Landfill
13570 St. Charles Rock Rd.
Bridgeton, MO 63044

Re: New Collection Well for Landfill
Expansion Area

Dear Bill:

This is a followup of our discussion today concerning a new collection well for the expansion area pit formerly called Black Diamond Lake.

The approved plans for the landfill expansion call for pumping from a collection well in the new 4-acre pit. Original plans were to construct a collection well with 48-inch diameter reinforced concrete pipe (RCP). Considerable thought has now been given to problems of installation and maintenance of a 48-inch RCP which would eventually be 250 feet high.

In recent experience with the old 48-inch RCP collection well in the old landfill area at St. Charles Rock Rd. and Taussig Rd. has shown the difficulties encountered in constructing a well in the landfill. Keeping the pipe plumb is job enough without the even greater problem of keeping landfill equipment from bumping into the pipe and pushing it over while compacting refuse. Several cracked pieces in the old well verify the problem.

We do not want to consider construction of a new well of RCP unless one can be reasonably sure it will operate satisfactorily when the landfill is filled 250 feet to top. This great depth represents a far greater problem than a shallow 50-foot deep well. Calculations have been made and verify that a 250-foot well constructed of regular RCP is not strong enough to stand and be functional when the landfill is completely filled. Calculations also indicate that the drag load will crush the pipe. The drag load is caused by settlement of earth and refuse around the pipe. This clinging settlement creates the drag load on the pipe.

A special thickness RCP would be required to assure its being functional when landfilling is complete. Costs for RCP from Price Bros. are:

48" dia. Class IV - \$60.60/ft. x 250' = \$15,150
Special RCP (24" ID, 49" OD) estimate 100/ft. x 250' = \$25,000

As an alternative, consideration was given to drilling a hole through the limestone next to the quarry pit wall and use this drilled hole as the collection well for the 4-acre pit.

The following drilling companies were contacted for price quotations:
Wabash Drilling Co.; Missouri Drilling Co.; Layne-Western; Test Drilling Co.;
St. Charles Drilling Co. Because of the 250-foot depth, only Test Drilling Co.

MEMORANDUM: West Lake Landfill, April 21, 1981

If the Mo. DNR is to give consideration to permit landfilling the three-acre hole called Black Diamond Lake within three months, a suitable plan must be presented so that it can be pumped out and the 30+ million gallons of liquid temporarily stored for future treatment.

Possible alternate locations are:

1. Field across road suitable for a 5 to 6-acre 20-foot deep lagoon which would minimize the area of the lagoon. A permit will be required from the City of Bridgeton and this could take at least 90 days before work could start, if it were granted.
2. Shallow lagoon located over 10 to 12 acres across the top of the old landfill area. This is a higher cost for more earthwork, liners, piping costs, etc. It has a higher potential for odor problems with proposed lagoons closer to St. Charles Rock Rd.
3. Consider using a 5+ acre corner of the large quarry hole for temporary lagoon. This would restrict quarry operation to the other end of the pit.

Alternate 1 requires a permit and also requires the shorter time schedule or 9 to 12 months guaranteed time to treat all liquid in holding basin. It also requires a City permit which will take at least 90 days and thence, be unacceptable since anticipated landfill life is only two and one-half months, as of now.

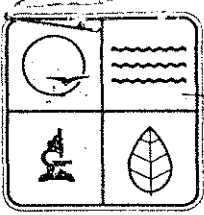
Alternates 2 and 3 should not require City permits since they are on areas already zoned for quarry and landfill operations. Alternates 2 and 3, being closer to St. Charles Rock Rd., have a higher potential for odor problems.

Alternate 3 is recommended because the construction time and cost is less than Alternates 1 and 2.

DAVID E. MURRAY

Attachment 3

Solid Waste Disposal Area Operating Permit# 118906



S.W.
January 25, 1979

Jan 26 1979

MISSOURI DEPARTMENT OF NATURAL RESOURCES
P.O. Box 176 Jefferson City, Missouri 65101 (314) 751-4422

Ms. Catherine Cruse, President
West Lake Landfill, Inc.
Route 1, Box 206
Bridgeton, MO 63042

Dear Ms. Cruse:

Enclosed is the official Solid Waste Disposal Area Operating Permit for West Lake Landfill, Inc., which I believe is self-explanatory. Also enclosed is a copy of the Report of Approval of Plans and Specifications for Solid Waste Disposal Area, St. Louis, Missouri, dated January 18, 1979, which is made a part of the description and conditions of this permit.

If you have any questions, please advise.

Sincerely,

Robert M. Robinson, P.E.
Director
Solid Waste Management Program

RMR:pdi

Enclosures

cc: Mr. William J. McCullough, Vice President
Mr. L. E. Trump
East-West Gateway Coordinating Council
St. Louis Regional Office ✓
Mr. Paul Himebaugh, P.E.

Joseph P. Teasdale Governor
Carolyn Ashford Director

JAN 18 1979

REPORT OF APPROVAL OF PLANS AND SPECIFICATIONS
FOR SOLID WASTE DISPOSAL AREA
ST. LOUIS, MISSOURI

January 18, 1979

INTRODUCTION

An Application for Operating Permit has been filed with the Missouri Department of Natural Resources requesting a permit to operate a sanitary landfill designated in the application as the West Lake Sanitary Landfill. The application was filed by Catherine Cruse, President, West Lake Landfill, Inc. Plans, specifications and operating procedures for the West Lake Sanitary Landfill, St. Louis County, Missouri, have been submitted to the Department of Natural Resources, Solid Waste Management Program, for review and approval by Paul H. Himebaugh, P.E. These plans, specifications and operating procedures have been reviewed for compliance with the Missouri Solid Waste Management Law (Sections 260.200 to 260.245, RSMo., Cum. Supp. 1975) and the Missouri Solid Waste Rules and Regulations.

BRIEF DESCRIPTION

The proposed sanitary landfill is located in U.S. Survey 131, Township 47 N., Range 5 E., St. Louis County, Missouri. The proposed site consists of a total of approximately 212.59 acres of which approximately 13 acres will be utilized for the sanitary landfill. The types of waste to be accepted will consist of municipal solid waste. No hazardous wastes, bulk liquids, semi-solids, sludges containing free moisture, highly flammable or volatile substances, unexpended pesticide containers, pesticides, raw animal manure, septic tank pumpings, raw sewage and industrial process sludges, radioactive materials, and explosives shall be accepted. The area method of sanitary landfill operation will be utilized to fill the open pit limestone quarry where mining is no longer taking place.

All fencing, gates, equipment maintenance buildings, all-weather access roads, signs, surface-water control devices, operating equipment, standby equipment and other necessary appurtenances shall be provided as per the approved plans, specifications and operating procedures.

APPROVAL

The plans, specifications and operating procedures described above have been examined as to sanitary features of design which might affect the operation of the solid waste disposal area as a sanitary landfill. Approval of the plans, specifications and operating procedures is hereby given. This approval is given with the explicit understanding that the sanitary landfill will be

ST. LOUIS, MISSOURI

Page 2

APPROVAL CONT.

developed and operated in compliance with the plans, specifications and operating procedures, with the Missouri Solid Waste Rules and Regulations, and in accordance with the Missouri Solid Waste Management Law. This approval is not to be construed as compliance with any existing local ordinances or zoning requirements. The Department of Natural Resources reserves the right to withdraw the approval of these plans, specifications and operating procedures at any time that it is found that additional construction or alteration of the sanitary landfill is necessary to assure compliance with the rules and regulations and to afford adequate protection of the public health.

Roma P. Jenkins

Roma P. Jenkins

Environmental Engineer

Technical Services Section

Solid Waste Management Program

RPJ:d1

MISSOURI DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality
Solid Waste Management Program

SOLID WASTE DISPOSAL AREA OPERATING PERMIT

In accordance with Section 260.205, Paragraph 2, RSMo, Supplement 1973, the Missouri Department of Natural Resources hereby approves the application and issues Permit Number 118906 to West Lake Landfill, Inc., Catherine Cruse, President, the application as the West Lake Sanitary Landfill, Inc., located in XXXX U.S. Survey 131, Township 47 N., Range 5 E., St. Louis County, Missouri. This permit applies only to that tract of land of approximately 133 acres covered by the engineering plans, specifications and operating procedures submitted to the Department.

Operation of this solid waste disposal area shall be in accordance with the provisions of the Missouri Solid Waste Management Law (Sections 260.200 to 260.245, RSMo, Supplement 1973), the rules and regulations promulgated thereunder, and the engineering plans, specifications and operating procedures approved by the Department. The Department does not examine structural features of design or efficiency of mechanical equipment and the issuance of this permit does not imply approval of those features.

The Department reserves the right to revoke or modify this permit after due notice if it is found that the holder of the permit is in violation of the Missouri Solid Waste Management Law, the Missouri Solid Waste Rules and Regulations or failure to operate in accordance with the approved plans, specifications and operating procedures or is creating a public nuisance through hazard or environmental pollution. Furthermore, it is found that additional construction or alteration of the solid waste disposal area is necessary to comply with any and all rules and regulations promulgated in accordance with the Missouri Solid Waste Management Law, then, and in that event, the Department has and does hereby reserve the right to revoke or modify this permit.

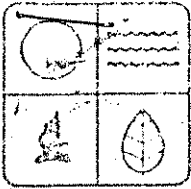
This permit for operation of a solid waste disposal area is issued only to the person named in the application and shall not be transferable. This permit shall become void after notice to the Department by the person named in the permit that said person has discontinued operation of the disposal area. The Department may revoke this permit after determining an area has not operated for a period of one year. This permit is issued contingent upon, and may be revoked for failure to comply with any and all conditions described on the attached Report of Approval of Plans and Specifications for Solid Waste Disposal Area.

By 
DIRECTOR, DEPARTMENT OF NATURAL RESOURCES
Date January 22, 1979

Attachment 4

Solid Waste Disposal Area Operating Permit# 118909

3,000 St. L. Co.
West Lake LF



RECEIVED
AUG 25 1981
MDJ

MISSOURI DEPARTMENT OF NATURAL RESOURCES
P.O. Box 1368 1915 Southridge Drive Jefferson City, Missouri 65102 (314) 751-3241

August 21, 1981

William J. McCullough
13570 St. Charles Rock Road
Bridgeton, MO 63044

Dear Mr. McCullough:

Enclosed is your official "Solid Waste Disposal Area Operating Permit", which I believe is self-explanatory. Also enclosed is copy of the "Report of Approval of Plans and Specifications for Solid Waste Disposal Area, St. Louis County, Missouri", dated August 13, 1981, which is made a part of the description and conditions of this permit.

If you have any questions, please advise.

Sincerely,

John D. Doyle, P.E., Chief
Technical Services Section
Solid Waste Management Program

JD/bki

Enclosures

cc: East-West Gateway Coordinating Council
St. Louis Regional Office
Reitz & Jens, Inc.

Christopher S. Bond Governor
Fred A. Lafser Director

Division of Environmental Quality
Robert J. Schreiber Jr., P.E. Director

REPORT OF APPROVAL OF PLANS AND SPECIFICATIONS
FOR SOLID WASTE DISPOSAL AREA
ST. LOUIS COUNTY, MISSOURI

RECEIVED
AUG 25 1981

August 13, 1981

INTRODUCTION

An application for Operating Permit has been filed with the Missouri Department of Natural Resources requesting a permit to operate a sanitary landfill designated in the application as the West Lake Landfill, Inc. - 3 acre expansion. The application was filed by William J. McCullough, President. Plans, specifications and operating procedures for the West Lake Landfill, Inc. St. Louis County, Missouri, have been submitted to the Department of Natural Resources, Solid Waste Management Program, for review and approval by Reitz and Sons, Inc. These plans, specifications and operating procedures have been reviewed for compliance with the Missouri Solid Waste Management Law (Sections 260.200 to 260.245, RSMo., Cum. Supp. 1978) and the Missouri Solid Waste Rules and Regulations.

BRIEF DESCRIPTION

The proposed sanitary landfill expansion is located in U.S. Survey 131, Township 47N, Range 5E, St. Louis County, Missouri. The proposed site consists of a total of approximately 3 additional acres of quarry which will be utilized for sanitary landfill. Final fill elevations on the adjacent previously permitted (#118906) 6 acre fill area have also been revised. The types of wastes to be accepted will consist of municipal solid waste and demolition and construction waste. Approval to dispose of special wastes other than the wastes listed above (except hazardous waste, explosives or radioactive material) will be considered on a case-by-case basis, as provided in 10 CSR 80-3.010 (3). The area method of sanitary landfill operation will be utilized. Upon completion of the landfill, the area will receive final cover, grading and seeding.

All fencing, gates, equipment maintenance buildings, all-weather access roads, signs, surface-water control devices, operating equipment, standby equipment and other necessary appurtenances shall be provided as per the approved plans, specifications and operating procedures.

CONDITION(S)

The following condition(s) are an integral part of the permit. Compliance with these condition(s) shall, in part, determine compliance with the permit.

1. An eight foot wide clay liner is to be installed along the vertical rock faces of the northeast and southeast sides of the quarry pit. Records substantiating liner construction and installation shall be kept.
2. Prior to use of the quarry pit for landfilling, the accumulated leachate in the pit shall be completely pumped out to the temporary holding lagoon which has been constructed southwest of the quarry property. After the

leachate has been pumped out of the pit, 10 feet of quarry run limestone will be placed in the pit bottom. This layer will be covered by a 4 to 10 foot thick earth blanket. A collection well in the pit will be installed in conjunction with the installation of the quarry run limestone and earth blanket layers. The collection well in the new pit shall be used to pump leachate out of the pit to the leachate treatment plant such that the leachate level never rises above 8 feet from the pit bottom. Leachate level is to be maintained at least two feet below the top of the 10 foot thick quarry run gravel layer in the pit bottom or no more than 8 foot deep. The collection well and pump to the west of the rock wall separating the old and new landfill pits shall be operated such that leachate is maintained at the lowest practicable level.

3. If decomposition gases migrate from or cause odor problems in the environs of the landfill, an active gas collection system shall be installed into the landfill upon completion of filling of this new area. The present gas collection and burning system shall be maintained in operating condition and run continuously until such time as it is replaced by a different system.

APPROVAL

The plans, specifications and operating procedures described above have been examined as to sanitary features of design which might affect the operation of the solid waste disposal area as a sanitary landfill. Approval of the plans, specifications and operating procedures is hereby given. This approval is given with the explicit understanding that the sanitary landfill will be developed and operated in compliance with the plans, specifications and operating procedures with the condition(s) of the permit, with the Missouri Solid Waste Rules and Regulations, and in accordance with the Missouri Solid Waste Management Law. This approval is not to be construed as compliance with any existing local ordinances or zoning requirements. The Department of Natural Resources reserves the right to withdraw the approval of these plans, specifications and operating procedures at any time that it is found that additional construction or alteration of the sanitary landfill is necessary to assure compliance with the rules and regulations and to afford adequate protection to the public health.

Thomas B. Ellis

Thomas B. Ellis
Environmental Engineer
Solid Waste Management Program

MISSOURI DEPARTMENT OF NATURAL RESOURCES
Division of Environmental Quality
Solid Waste Management Program

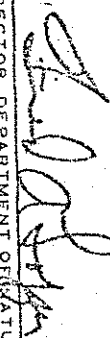
SOLID WASTE DISPOSAL AREA OPERATING PERMIT

In accordance with Section 260.205, Paragraph 2, RSMo, Supplement 1973, the Missouri Department of Natural Resources hereby approves the application and issues Permit Number 118909 to William J. McCullough for the operation of a solid waste disposal area set forth in

the application as the West Lake Landfill, Inc.
located in the U.S. Survey 131
St. Louis County, Missouri. This permit applies only to that tract of land of approximately Township 47N Range 5E acres covered by the engineering plans, specifications and operating procedures submitted to the Department.

A condition of this solid waste disposal area shall be in accordance with the provisions of the Missouri Solid Waste Management Act, Sections 260.200 to 260.245, RSMo, Supplement 1973, the rules and regulations promulgated thereunder, and the engineering plans, specifications and operating procedures approved by the Department. The Department does not examine structural or mechanical design or efficiency of mechanical equipment and the issuance of this permit does not imply approval of those features. The Department reserves the right to revoke or modify this permit after due notice if it is found that the holder of the permit is in violation of the Missouri Solid Waste Management Law, the Missouri Solid Waste Rules and Regulations, or failure to operate in accordance with the approved plans, specifications and operating procedures or is creating a public nuisance, health hazard or environmental pollution. Furthermore, if it is found that additional construction or alteration of the solid waste disposal area is necessary to comply with any and all rules and regulations promulgated in accordance with the Missouri Solid Waste Management Law, then, and in that event, the Department has and does hereby reserve the right to revoke or modify this permit.

This permit for operation of a solid waste disposal area is issued only to the person named in the application and shall not be transferable. This permit shall become void after notice to the Department by the person named in the permit that said person has ceased operation of the disposal area. The Department may revoke this permit after determining an area has not operated for a period of one year. This permit is issued contingent upon and may be revoked for failure to comply with any and all conditions described on the attached "Report of Approval of Plans and Specifications for Solid Waste Disposal Area".

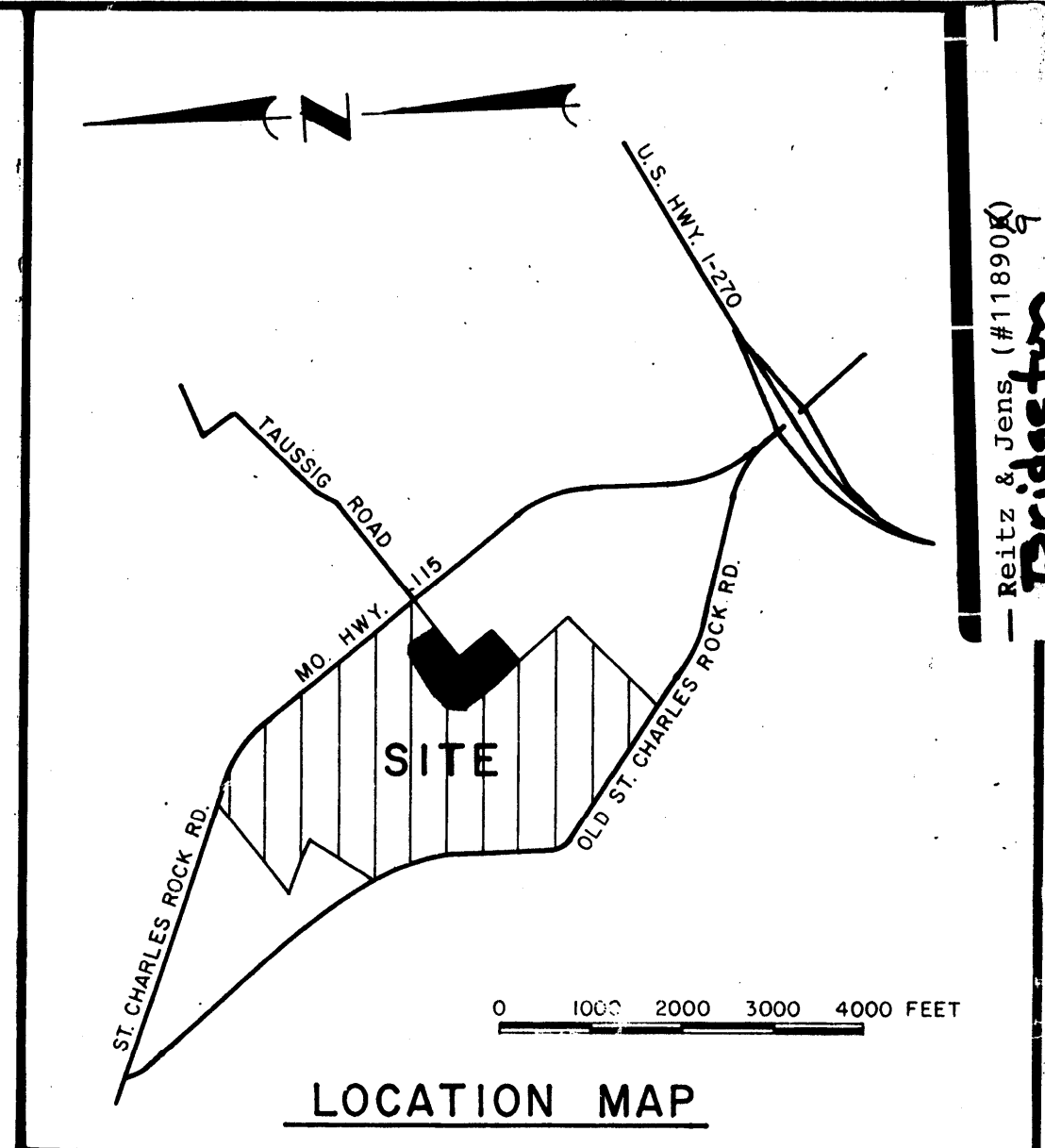
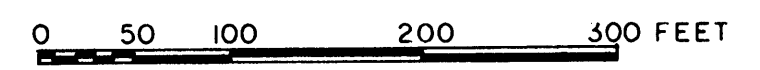
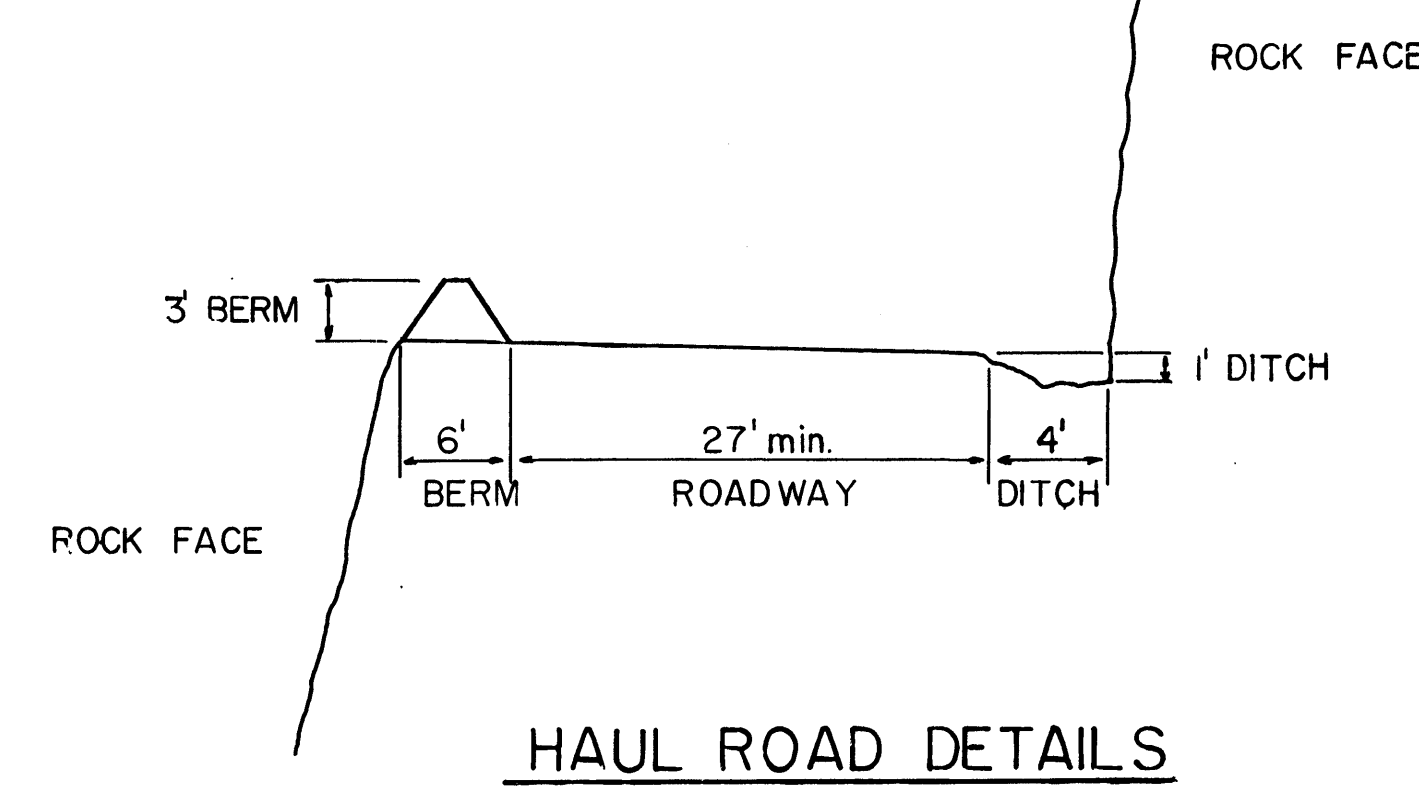
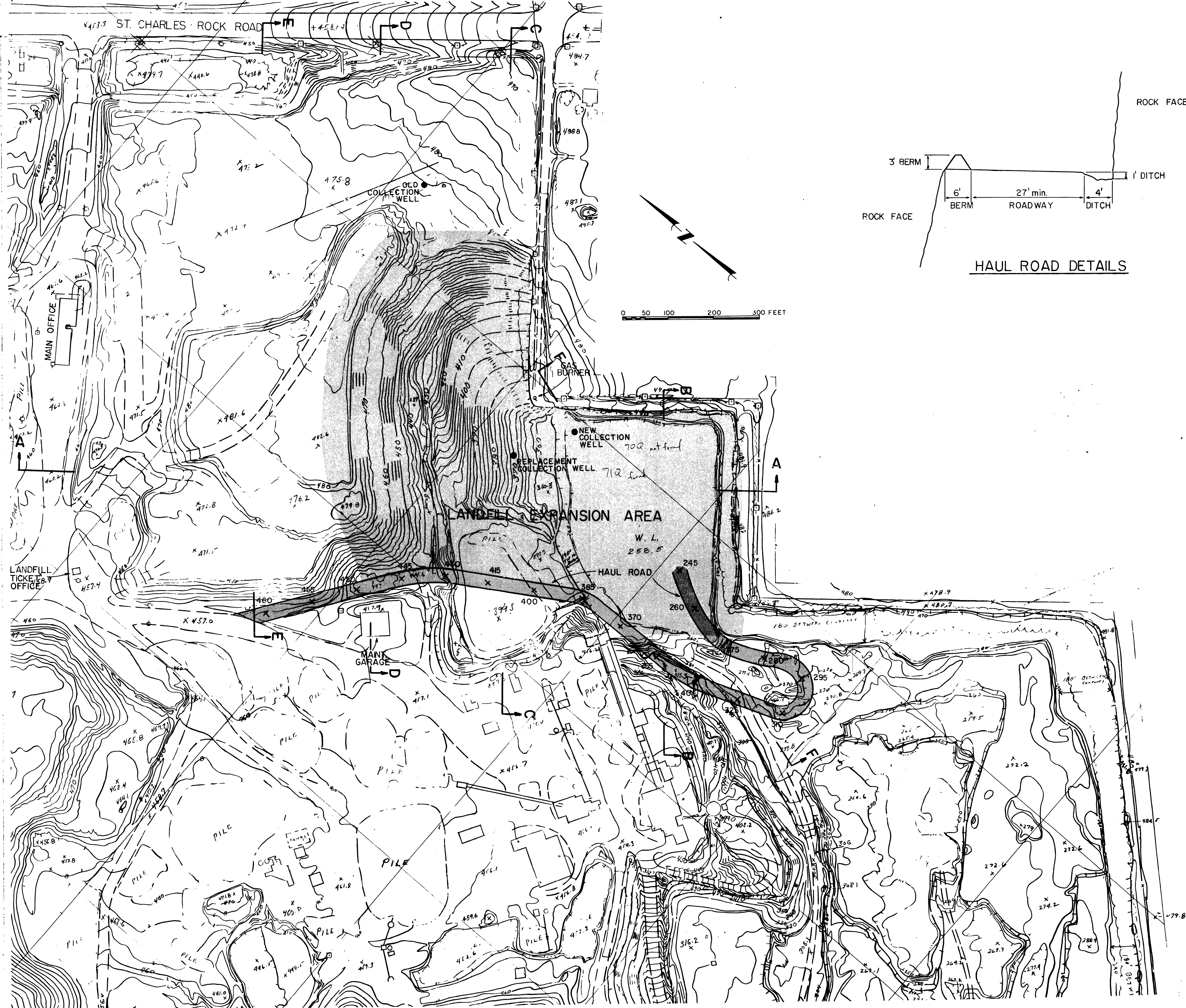
By 
DIRECTOR, DEPARTMENT OF NATURAL RESOURCES

Date August 20, 1981

Attachment 5

1981 drawing entitled "*West Lake Landfill, Inc. Topographical Map*" prepared by Reitz & Jens, Inc.

184.09



Bridgman
R. J. & Sons, Inc. (#11890K)

LANDFILL
TICKETS
OFFICE

MAIN OFFICE

MAIN
GARAGE

LANDFILL EXPANSION AREA

HAUL ROAD

NEW COLLECTION WELL
702' not found

REPLACEMENT COLLECTION WELL
712' not found

W. L.
258.5



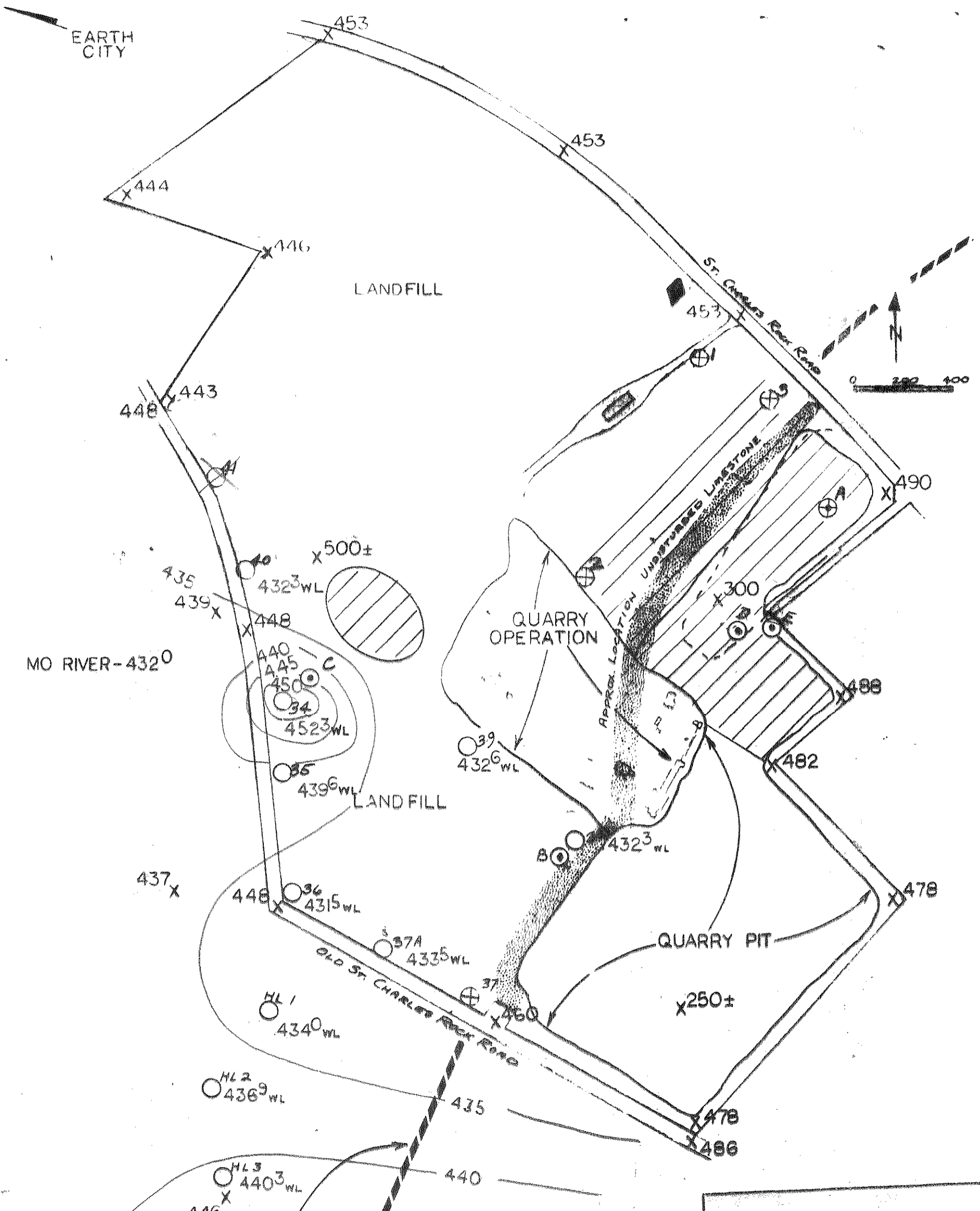
Revised 7-30-81 Added Replacement Collection Well

| | |
|--|---------|
| WEST LAKE LANDFILL INC. | |
| TOPOGRAPHICAL MAP | |
| REITZ & JENS, INC. CONSULTING ENGINEERS 1040 NORTH LINDBERGH BLVD ST LOUIS, MISSOURI 63132 (314) 993-4132 | |
| DESIGNED | D.E.M. |
| DRAWN | D.L.B. |
| CHECKED | D.E.M. |
| ISSUED | 6-26-81 |

Attachment 6

Groundwater Elevations Drawing prepared by Reitz & Jens, Inc.

MO. RIVER-4320



MO RIVER-4320

DATE OF SAMPLING
11/16/82

HISTORICAL
EDGE OF
ALLUVIAL
VALLEY

- Active Landfill
- Collection Well
- Monitoring Well
- Damaged Well
- Proposed Monitoring Well
- X 440 Ground Elevation
- (411) Elevation/Bottom of Well
- 420WL Water Level

WEST LAKE LANDFILL
GROUND WATER CONTOURS
Reitz & Jens, Inc. March 1983

FIG. 7

Attachment 7

Groundwater Elevations Table prepared by Reitz & Jens, Inc.

WESTLAKE LANDFILL

Groundwater Elevations

| <u>Monitoring Well</u> | <u>Top of Pipe Elevation</u> | <u>Surface Elevation</u> | <u>11/16/79</u> | <u>9/5/80</u> | <u>3/17/81</u> | <u>12/10/81</u> | <u>3/25/82</u> | <u>8/20/82</u> |
|------------------------|------------------------------|--------------------------|-----------------|---------------|----------------|-----------------|----------------|----------------|
| 1 | 456.44 | (ground level) | dry | - | - | - | - | - |
| 2 | 449.7 | 447.7 | dry | - | - | - | - | - |
| 3 | 442.33 | - | dry | - | - | - | - | - |
| 34 | 478.4 | 475.1 | 430.7 | 428.2 | 427.4 | 430.9 | 433.9 | - |
| 35 | 475.1 | 471.9 | 430.6 | 429.6 | 427.1 | 431.1 | 433.4 | 442.2 |
| 36 | 471.0 | 470.0 | dry | dry | dry | 432.0 | 432.7 | 448.2 |
| 37 | 459.9 | 458.8 | dry | dry | dry | 434.1 | 438.7 | 435.3 |
| 37A | 477.5 | 474.4 | 430.5 | 429.5 | 427.0 | 430.5 | 432.6 | 432.2 |
| 38 | 462.6 | 458.9 | 432.4 | 431.1 | 430.6 | 430.6 | 418.6 | 435.1 |
| 39 | 465.4 | 462.7 | 430.6 | 429.4 | 426.9 | 428.9 | 424.5 | 435.0 |
| 40 | 480.5 | 477.4 | 430.3 | 429.5 | 427.0 | 429.5 | 432.7 | 431.2 |
| 41 | 485.5 | | 431.2 | 429.2 | 426.5* | - | | - |

Collection Well

| | | | | | | | | |
|---|---------|-------|-------|-------|---|-------|----------------|---|
| A | 48" RCP | 429.1 | - | 343.1 | - | 396.4 | out of service | |
| B | 48" RCP | 490.7 | - | 440.2 | - | 364.7 | 459.7 | - |
| C | 24" RCP | 476.0 | 471.0 | 447.0 | - | 447.7 | 459.2 | - |
| D | 24" RCP | 506.2 | | | | | 459.2 | - |
| E | 12" PVC | 378.0 | | | | | | |

*Insufficient water for sampling.

Attachment 8

Solid Waste Disposal Area Operating Permit# 118912

JUSTICE
Permit



Division of Energy
Division of Environmental Quality
Division of Geology and Land Survey
Division of Management Services
Division of Parks and
Historic Preservation

JOHN ASHCROFT
Governor

FREDERICK A. BRUNNER
Director

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES

OFFICE OF THE DIRECTOR
1915 Southside Drive
P.O. Box 176
Jefferson City, Missouri 65102
Telephone 314-751-4422

CERTIFIED MAIL P196486810

[Handwritten signature]
DATE REC.

November 18, 1985

COPY

SLRO

Mr. William McCullough, President
West Lake Landfill, Inc.
13570 St. Charles Rock Road
Bridgeton, MO 63044

Supersedes
118906 & 118901

Dear Mr. McCullough:

RE: Solid Waste Disposal Area Operating Permit #118912.

An Application for Operating Permit has been filed with the Missouri Department of Natural Resources requesting a permit to operate a sanitary landfill designated in the application as the West Lake Landfill, Inc. Sanitary Landfill. The application was filed by West Lake Landfill, Inc. and submitted to the Department of Natural Resources for review and approval. The application includes engineering plans, and specifications, operating procedures and subsequent correspondence or amendments for the subject facility. The application has been prepared by Burns & McDonnell. The application has been reviewed for compliance with the Missouri Solid Waste Management Law (Section 260.200 to 260.245, RSMo, 1978) and the Missouri Solid Waste Management Rules and Regulations.

In accordance with Section 260.205, Paragraph 2, RSMo, 1978, the Missouri Department of Natural Resources hereby approves the application and issues Permit Number 118912 to West Lake Landfill, Inc. for the operation of a solid waste disposal area set forth in the application as the West Lake Landfill, Inc. Sanitary Landfill. This permit applies only to that tract of land of approximately 52 acres, as described by the engineering plans, specifications and operating procedures submitted to the department. This permit is issued for a period of ten (10) years. This permit expires at midnight on November 18, 1995, unless a complete application for a permit is submitted to the Waste Management Program at least 12 months before the expiration date. If an application for a permit is made prior to November 18, 1994, then this permit and its conditions remain in effect

2. Have available phone numbers of MDNR regional and central office contact people and a hazardous waste management consultant who can be contacted concerning specific wastes.
3. Attend a minimum of one seminar or conference emphasizing hazardous waste issues every two years.

The spotter will:

1. Maintain a list of special wastes that MDNR has authorized the landfill to accept including information on generator, type of waste and hauler.
2. Receive a minimum of one hour of training per quarter concerning hazardous waste identification and recognition. This training will be done by the landfill manager or a qualified hazardous waste management consultant.

until the effective date of a new permit, or effective date of denial of the application for a new permit. The department shall review this permit approximately five (5) years after the date of issuance to determine the compliance status of the landfill and shall modify the permit as necessary to assure that the facility continues to comply with applicable requirements of the provisions of Sections 260.200 to 260.245 RSMo and the rules and regulations adopted thereunder.

The final approved engineering plans, specifications and operating procedures described below are attached hereon and made an official part of this permit:

1. The completed Application for Operating Permit form, dated September 25, 1984, designating West Lake Landfill, Inc. as both the owner and operator of the facility.
2. The engineering report entitled Permit Application and Engineering Report for West Lake Landfill, Inc. Sanitary Landfill Expansion Bridgeton, Missouri, 1985; prepared by Burns & McDonnell; received July 5, 1985.
3. The operations manual entitled West Lake Landfill, Inc. Sanitary Landfill Expansion Operations Manual, 1985; prepared by Burns & McDonnell; received July 5, 1985.
4. Plan Sheets entitled West Lake Landfill, Inc. Sanitary Landfill, Bridgeton, Missouri, 1984; prepared by Burns & McDonnell, including: drawing 1, revision 1; drawing 2, revision 1; and drawings 3 through 5 (no revisions).
5. Letter dated September 25, 1985, to Mr. Thomas R. Gredell, P.E. from Mr. Robert M. Robinson, P.E. (including attachments) providing additional details of the landfill design and operation.
6. Document entitled Part IV, Post Closure Plan; received October 3, 1985; replaces the section of the engineering report entitled Part IV, Post Closure Plan.
7. Letter dated October 1, 1985, to Mr. William McCullough from Mr. Robert M. Robinson, P.E. (including attachments), received October 3, 1985, providing details of the Hazardous Waste Contingency Plan and the Waste Disposal Monitoring Plan.
8. Letter dated March 14, 1985, to Mr. Thomas R. Gredell, P.E. from Mr. Robert M. Robinson, P.E. providing additional details of the landfill design and operation.

9. Report entitled Spring Grouting Summary, West Lake Landfill, Inc. Bridgeton, Missouri, received April 30, 1985; prepared by Drilling Service Company; dated February 15, 1985, through April 18, 1985.
10. Report entitled Spring Grouting Summary, Grout Curtain #2, West Lake Landfill, Inc. Bridgeton, Missouri, received October 3, 1985; prepared by Drilling Service Company; dated May 23, 1985, through August 2, 1985.
11. Letter dated July 5, 1985, to Mr. John D. Doyle, P.E. from Mr. Robert M. Robinson, P.E. providing additional information concerning the grouting reports.
12. Report entitled Hydrogeologic Investigation, West Lake Landfill, Preliminary Phase Report, January, 1985; prepared by Burns & McDonnell; received March 18, 1985.
13. Report entitled Interim Report on the Proposed Groundwater Sampling Program for the Primary Phase of the Hydrogeologic Investigation, West Lake Landfill, St. Louis County, Missouri, October 1985; received October 8, 1985.

Approval of the application and issuance of this permit is given with the explicit understanding that the sanitary landfill will be developed and operated in compliance with the approved plans, specifications and operating procedures, with the conditions of the permit, with the Missouri Solid Waste Rules and Regulations, and in accordance with the Missouri Solid Waste Management Law. This permit is not to be construed as compliance with any existing local ordinances or zoning requirements. This permit for operation of a solid waste disposal area is issued only to the person named in the application and shall not be transferable.

Conditions

The following conditions are an integral part of the permit. Compliance with these conditions shall, in part, determine compliance with the permit.

1. This permit, Solid Waste Disposal Area Operating Permit #118912, encompasses the proposed expansion area and additional solid waste fill by West Lake Landfill, Inc. over the disposal areas permitted under Solid Waste Disposal Area Operating Permit Numbers 118906 and 118909 issued to West Lake Landfill, Inc. This document supersedes and replaces the previous permits and permit documents.
2. West Lake Landfill, Inc. shall establish and maintain an escrow fund for the purpose of providing post-closure care and maintenance of the landfill. The amount and manner of maintaining this fund shall be as described in the approved permit documents.

- A. Fifty percent of the first yearly cost of this fund shall be deposited in this fund prior to acceptance of solid waste.
- B. The existence and maintenance of this fund shall be verified to the department by the permittee prior to acceptance of solid waste. The maintenance of this fund shall be verified to the department annually prior to the anniversary date of establishment of the fund, in writing, by the financial institution wherein this fund is deposited.

3. An environmental assessment of the entire landfill site shall be initiated by West Lake Landfill, Inc. or any successor or assign ("hereinafter West Lake") immediately after the issuance of this permit. This assessment, including hydrogeologic investigation, shall be completed by November, 1986, and shall be used as the basis for the development of a monitoring program and feasibility study to assess necessary remedial action. The conclusions of the feasibility study shall be submitted to the department within two years after the issuance of this permit. Implementation of necessary remedial action will be undertaken by West Lake in accordance with reasonable design and construction scheduling. Additional groundwater monitoring requirements will be required, based on review of the hydrogeologic investigation and feasibility study.

4. Initial training of the waste inspector (spotter) shall be provided so that he/she is able to adequately perform the duties as described in the permit documents. At a minimum, the initial training for this employee shall include:

- A. Familiarization with 10 CSR 80-3.010(3), solid waste excluded.
- B. Identification and recognition of unacceptable wastes, as described in 10 CSR 80-3.010(3).

C. Familiarization with the necessary procedures to obtain approval of special waste disposal requests.

D. Provision of a list of all special wastes approved for disposal by the department.

5. Intermediate cover is not required until the fill is above the quarry rim, as proposed in the approved permit documents.

6. Leachate and sludge from leachate treatment shall be collected, treated and disposed of as per the approved permit documents.

A. Leachate shall be treated and disposed of in accordance with all applicable water quality laws, rules, regulations, and policies as enforced by the Water Pollution Control Program, Missouri Department of Natural Resources.

- B. West Lake Landfill, Inc. shall two times a year test the leachate and leachate treatment sludge for hazardous waste characteristics pursuant to 10 CSR 25-4.010 (2 through 5) and submit the results of such tests within sixty days to Missouri Department of Natural Resources. If hazardous wastes are detected in the leachate or sludge West Lake Landfill, Inc. shall implement proper handling of such hazardous wastes in accordance with the Missouri Hazardous Waste Management law, Rules and Regulations. } 12/10/85
- C. Sludge from the on-site leachate treatment system is acceptable for disposal at the landfill, unless tested to be a characteristic hazardous waste as per condition 6B.
- D. Static leachate levels in the collection sumps in the unfilled area of the quarry, as shown in the approved permit documents, will be maintained at a level less than 30 feet above the base of the sump. The leachate level shall be checked monthly, recorded and made available upon department request.
- E. Static leachate levels in the previously filled areas of the quarry, as shown on the approved permit documents, shall be maintained at a level less than 50 feet above the base of the sump. The leachate level shall be checked monthly, recorded and made available upon department request.
7. A. Groundwater monitoring shall be required as per the attached document entitled Monitoring Program for the West Lake Landfill, Inc. Sanitary Landfill. The wells shall be sampled within 30 days of issuance of the permit. The first sample will be used as a background sample and should be analyzed for the extended list of parameters, as if it were an annual analysis.
- B. Three groundwater monitoring wells have been installed in the area of the grout curtain in the northeast corner of the large quarry. Two wells were installed during the placement of the initial grout curtain and were designated as groundwater monitoring wells (GMMW) #4/III and (GMMW) #14/III in the application for operating permit. The third well was installed during the placement of grout curtain #2 and was designated as groundwater monitoring well (GMMW) #17/IV in the application for operating permit. The water level in these wells shall be monitored monthly, recorded, and made available upon department request.
- C. All three wells will be monitored, unless the department is requested to reevaluate the monitoring program. If requested and approved, one or more of the wells can be eliminated from the sampling program if hydraulic communication between the wells is verified.

- D. Additional sampling points may be added to the monitoring program depending on the results of the hydrogeologic investigation (See Condition #4).
8. The following previously approved special wastes are approved for disposal under permit #118912:
- A. Fly ash derived from a coal burning industrial boiler, generated by McDonnell Douglas Corporation; 400 tons per month; approved November 1, 1984.
 - B. Incinerator ash derived from municipal refuse incineration, generated by McDonnell Douglas Corporation; 800 cubic yards per month; approved November 1, 1984.

A special waste disposal request will have to be submitted to, and approved by, the Waste Management program prior to accepting any other special waste as per 10 CSR 80-3.010(3).

9. Each eight inch lift of the twelve foot wide pad in the northeast corner should be tested for soil density to confirm that a minimum compaction of 90% of the standard proctor density is obtained.
10. All surface water discharges shall be made in accordance with all applicable water quality laws, rules, regulations and policies as enforced by the Water Pollution Control Program, Missouri Department of Natural Resources.
11. Methane gas shall be vented or burned in accordance with all applicable air quality laws, rules, regulations, and policies as enforced by the appropriate air pollution control regulatory agency.
12. Department review and approval of any planned final use is required prior to implementing a designated, commercial, final use of the site.
13. Within six months of the date of issuance of the permit, two copies of a final, comprehensive engineering report shall be submitted to the Waste Management Program. This report shall incorporate all present design and operating information into one reference manual detailing the final approved plans and specifications for the design and operation of the proposed sanitary landfill. This report shall incorporate all information required by regulation, eliminate all contradictory information, and include all revisions and additions to the original application for operating permit, as approved.

Facility Description

The proposed sanitary landfill is located in U.S. Survey 131, Township 46 North, Range 5 East, St. Louis County, Missouri. The proposed site consists of a total of approximately 214 acres of which approximately

52 acres will be utilized for the sanitary landfill. The types of wastes to be accepted will consist of municipal solid waste, bulky waste, dead animals, demolition and construction waste, and brush and untreated wood waste. Approval to dispose of special wastes other than the wastes listed above (except hazardous wastes, explosives, or radioactive material) will be considered on a case-by-case basis, as provided in 10 CSR 80-3.010(3). The area method of sanitary landfill operation will be utilized. The fill heights and area locations are to be completed as shown on the approved engineering plans and specifications and maintenance of the area shall be provided in accordance with the post-closure maintenance plan. Upon completion of the landfill, it will be used for as yet undesignated commercial operations.

All fencing, gates, equipment, maintenance buildings, all-weather access roads, signs, surface-water control devices, operating equipment, standby equipment and other necessary appurtenances shall be provided as per the final approved plans, specifications and operating procedures. The plans, specifications and operating procedures described above have been examined as to sanitary features of design which might affect the operation of the solid waste disposal area as a sanitary landfill.

Modification and Termination of Permit

The department reserves the right to revoke or modify this permit after due notice:

1. If it is found that the holder of the permit is in violation of the Missouri Solid Waste Management Law, or the Missouri Solid Waste Management Rules and Regulations;
2. For failure to operate in accordance with the approved plans, specifications and operating procedures;
3. For creating a public nuisance, health hazard or causing environmental pollution;
4. For failure to comply with any and all conditions of the permit, as described herein;
5. If it is found that additional construction or alteration of the solid waste disposal area is necessary to comply with any and all rules and regulations promulgated in accordance with the Missouri Solid Waste Management Law;
6. If it is determined a facility has not been operated for a period of one year.

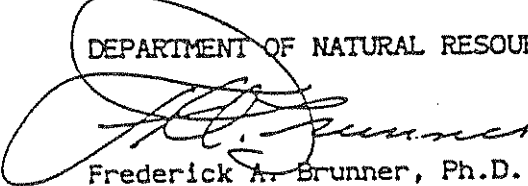
This permit shall become void after notice to the department by the person named in the permit that said person has discontinued operation of the disposal area.

Mr. William McCullough
November 18, 1985
Page 8

Upon initiation of operation at your landfill, you will have indicated your acknowledgement and acceptance of this permit and conditions of the permit. If you have any questions, please contact the Waste Management Program at (314) 751-3241 or P. O. Box 176, Jefferson City, MO 65102.

Sincerely,

DEPARTMENT OF NATURAL RESOURCES



Frederick A. Brunner, Ph.D., P.E.
Director

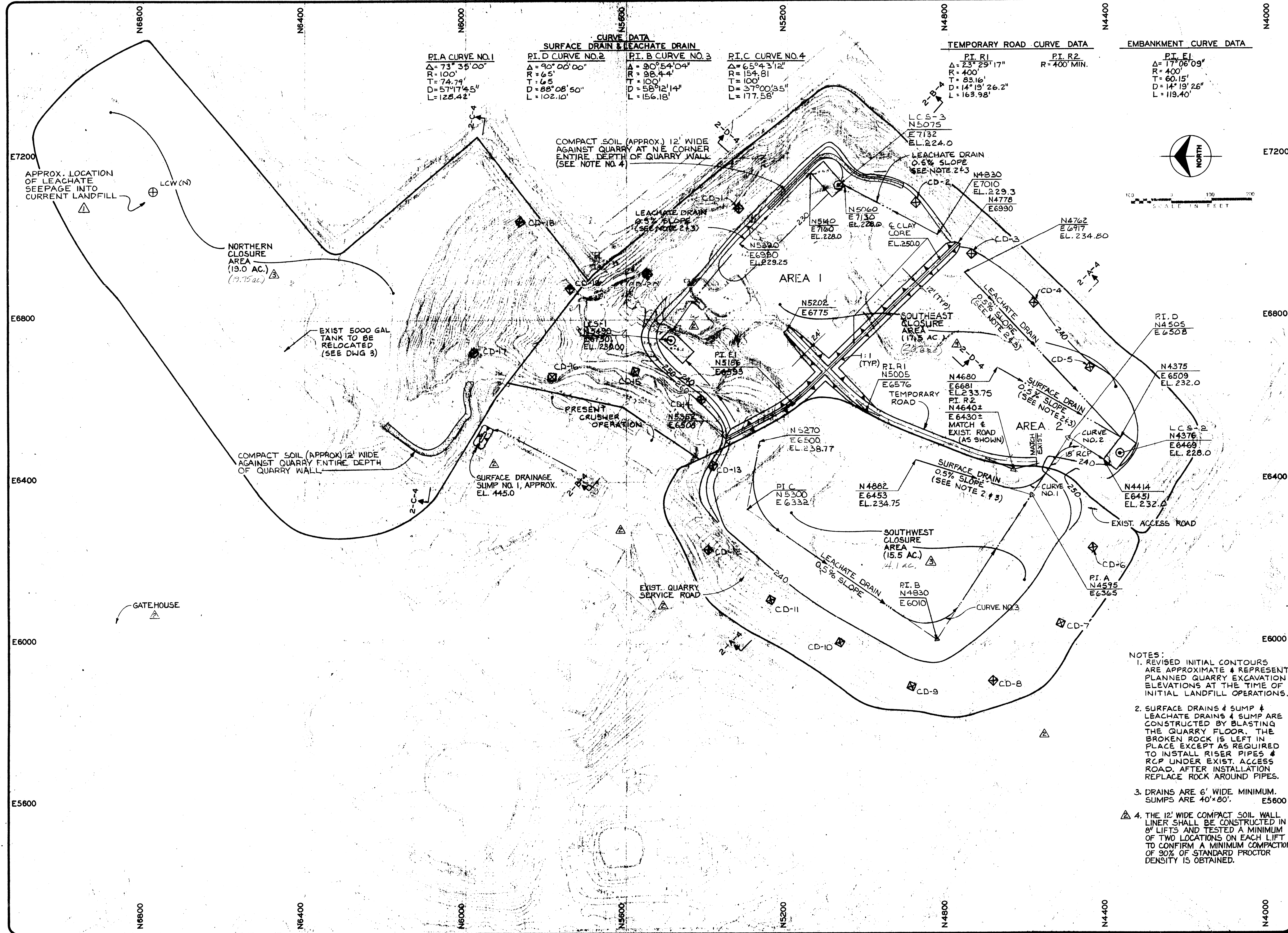
FAB:mpl

cc: East-West Gateway Regional Planning Commission
Mr. Robert M. Robinson, P.E.

bcc: St. Louis Regional Office
Department of Natural Resources
Division of Environmental Quality
Waste Management Program

Attachment 9

1985 drawing entitled "*West Lake Landfill, Inc. Sanitary Landfill Expansion, Original Contours and Initial Construction*" prepared by Burns & McDonnell



PI. A CURVE NO. 1
 $\Delta = 73^\circ 35' 00''$
 $R = 100'$
 $T = 74.79'$
 $D = 57' 17.45''$
 $L = 128.42'$

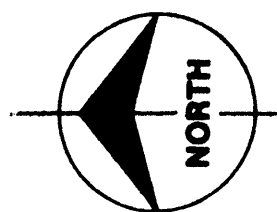
PI. D CURVE NO. 2
 $\Delta = 90^\circ 00' 00''$
 $R = 65'$
 $T = 65'$
 $D = 88^\circ 08' 50''$
 $L = 102.10'$

PI. B CURVE NO. 3
 $\Delta = 90^\circ 54' 04''$
 $R = 98.44'$
 $T = 100'$
 $D = 58^\circ 12' 14''$
 $L = 156.18'$

PI. C CURVE NO. 4
 $\Delta = 65^\circ 43' 12''$
 $R = 154.81'$
 $T = 100'$
 $D = 37^\circ 00' 35''$
 $L = 177.58'$

TEMPORARY ROAD CURVE DATA
 PI. R1
 $\Delta = 23^\circ 29' 17''$
 $R = 400'$
 $T = 83.16'$
 $D = 14^\circ 19' 26.2''$
 $L = 163.98'$
 PI. R2
 $R = 400'$

EMBANKMENT CURVE DATA
 PI. E1
 $\Delta = 17^\circ 06' 09''$
 $R = 400'$
 $T = 60.15'$
 $D = 14^\circ 19' 26''$
 $L = 119.40'$



| REVISION NO. | DATE | BY | REVISION |
|--------------|----------|-----|---|
| 1 | 9-25-85 | JH | ADDED NOTE ON LEACHATE SEEPAGE |
| 2 | 12-20-85 | JDR | REMOVED ENTRANCE ROAD & GATE, ADDED GATEHOUSE, REVISED LOCATION OF CURVE 1, AND SURFACE DRAINAGE SLUMP NO. 1. ADDED NOTE 4. |
| 3 | 1-27-91 | JDR | LANDFILL CLOSURE AREAS SHOWN. |



Burnts & McDonnell, Inc.
 ENGINEERS - ARCHITECTS - CONSULTANTS
 Kansas City, Missouri
 84-075-1-001

| DATE | DESIGNED | DRAWN | CHECKED | PRINT DATE |
|---------------|----------|--------|----------|------------|
| JUNE 25, 1985 | ERIO | ROCKEY | ROBINSON | |

WEST LAKE LANDFILL, INC.
SANITARY LANDFILL EXPANSION
BRIDGETON, MISSOURI

ORIGINAL CONTOURS AND INITIAL CONSTRUCTION

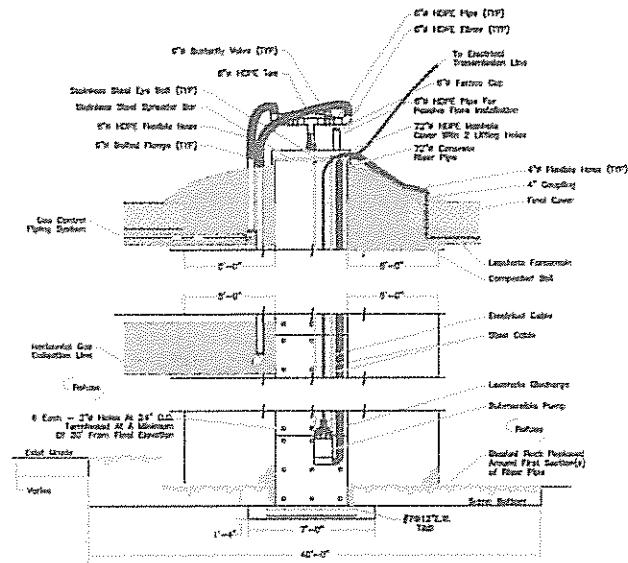
cont'd. pt

drawing 2 of 3 sheets

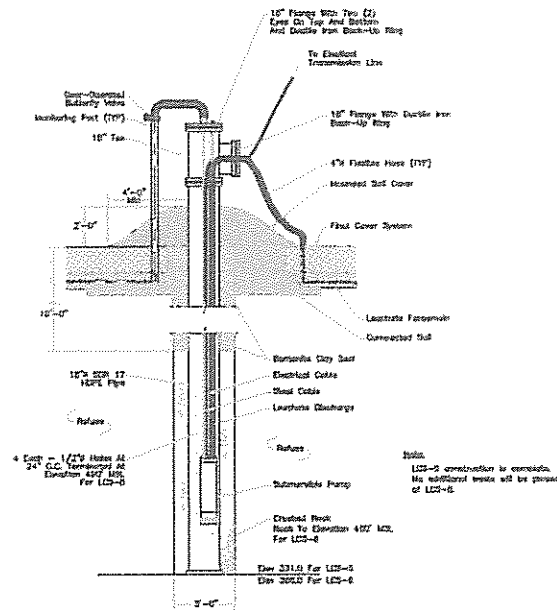
- NOTES:
1. REVISED INITIAL CONTOURS ARE APPROXIMATE & REPRESENT PLANNED QUARRY EXCAVATION ELEVATIONS AT THE TIME OF INITIAL LANDFILL OPERATIONS.
 2. SURFACE DRAINS & SLUMP & LEACHATE DRAINS & SLUMP ARE CONSTRUCTED BY BLASTING THE QUARRY FLOOR. THE BROKEN ROCK IS LEFT IN PLACE EXCEPT AS REQUIRED TO INSTALL RISER PIPES & RCP UNDER EXIST. ACCESS ROAD. AFTER INSTALLATION REPLACE ROCK AROUND PIPES.
 3. DRAINS ARE 6' WIDE MINIMUM. SUMPS ARE 40'x80'.
 4. THE 12' WIDE COMPACT SOIL WALL LINER SHALL BE CONSTRUCTED IN 8' LIFTS AND TESTED A MINIMUM OF TWO LOCATIONS ON EACH LIFT TO CONFIRM A MINIMUM COMPACTION OF 90% OF STANDARD PROCTOR DENSITY IS OBTAINED.

Attachment 10

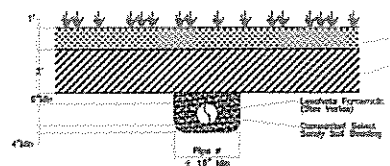
**1996 drawing entitled "*Leachate Collection System & Details*" prepared by Midwest
Environmental Consultants**



LEACHATE COLLECTION WELLS
LCS-1, LCS-2, LCS-3, AND LCS-4
Not To Scale



LEACHATE COLLECTION WELLS
LCS-5 AND LCS-6
Not To Scale



TRENCH CROSS-SECTION FOR LEACHATE
COLLECTION SYSTEM FORCE MAIN
Not To Scale

Note:
Vegetation and improved clay
layers may be required to suit
local conditions of the waste
fills. Double-lined pipe will
be utilized outside of the waste
fills.



Legend

- Existing Leachate Collection Lines
- - - Proposed Leachate Collection Force Main
- LCS-1 Leachate Collection Well

Well Locations

| Well | Northing | Easting |
|-------|----------|---------|
| LCS-1 | 1067635 | 516268 |
| LCS-2 | 1066574 | 516034 |
| LCS-3 | 1067248 | 516674 |
| LCS-4 | 1067194 | 515711 |
| LCS-5 | 1066320 | 516565 |
| LCS-6 | 1066906 | 516876 |

MIDWEST
 ENVIRONMENTAL
 CONSULTANTS, P.C.

Laidlaw Waste Systems (Bridgeton), Inc.
 Sanitary Landfill
 Facility Upgrade And Permit Modification
 Leachate Collection System And Details

| NO. | DATE | BY | DESCRIPTION |
|-----|------|----|-------------|
| | | | |
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| | | | |

Attachment 11

**1993 drawings entitled "*Gas Collection System Bridgeton Sanitary Landfill*" prepared by
Waste Energy Technology**

RECORD CONSTRUCTION DRAWINGS
 GAS COLLECTION SYSTEM
 FOR
BRIDGETON SANITARY LANDFILL
 BRIDGETON, MISSOURI
 LAIDLAW WASTE SYSTEMS, INC.

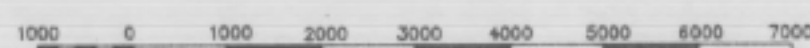


SITE LOCATION MAP



ST. CHARLES QUADRANGLE
 MISSOURI
 7.5 MINUTE SERIES (TOPOGRAPHIC)

SCALE 1:24000



DWG

TITLE

| | |
|------|--|
| 1 | RECORD CONSTRUCTION WELL AND HEADER LAYOUT |
| 2 | RECORD CONSTRUCTION HEADER ROUTE SURVEY DATA |
| 3 | WELL AND WELLHEAD DETAILS |
| 4 | TRENCH HEAD DETAILS |
| 5 | MANHOLE DETAILS |
| 6 | HEADER DETAILS |
| 7 | BLOWER/FLARE STATION DETAIL |
| 8-13 | IT MCGILL (JOHN ZINK) ENCLOSED FLARE SHOP DRAWINGS |

PREPARED BY:

WASTE ENERGY TECHNOLOGY, INC.
 11 TUPELO AVENUE SE
 FT. WALTON BEACH, FL 32548
 (904) 243-0033

PREPARED FOR:

LAIDLAW WASTE SYSTEMS, INC.
 2340 ARLINGTON HEIGHTS ROAD
 SUITE 230
 ARLINGTON HEIGHTS, IL 60005
 (708) 439-6686

REVIEW

TOPOGRAPHIC REFERENCE

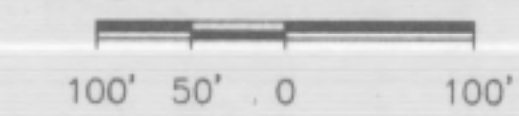
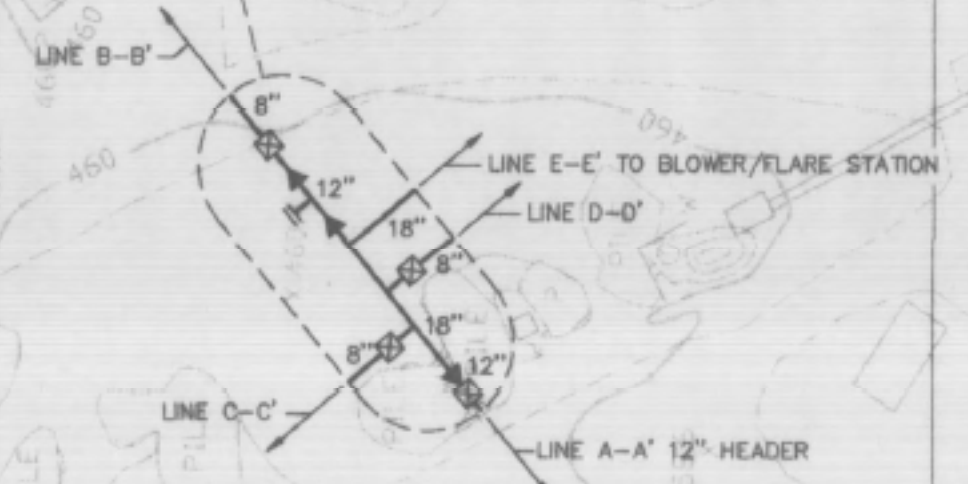
TOPOGRAPHIC BASE MAP:
PROVIDED BY: LAIDLAW WASTE SYSTEMS, INC.

LEGEND

- CPT 8 ▲ CONTROL POINT
- W-10 Ⓞ GAS EXTRACTION WELL (SEE DETAILS 1/3 AND 2/3)
- LCS-2 ● LEACHATE COLLECTION SUMP (SEE DETAILS 1/5 AND 3/5)
- GC-4 ◻ GAS COLLECTION MANHOLE (SEE DETAILS 5/4, 2/5, 4/5, AND 5/5)
- CD-1 ⊙ CONDENSATE DRAIN (SEE DETAILS 4/4 AND 7/6)
- 12" GAS COLLECTION HEADER (SEE DETAIL 1/6)
- 8" GAS COLLECTION TRENCH (SEE DETAILS 2/6 AND 3/6)
- TRW-1 TRENCH HEAD CONNECTION (SEE DETAIL 3/4)
- TRW-5 TRENCH ROCK WALLS (SEE DETAILS 1/4 AND 2/4)
- 8" EXISTING GAS COLLECTION TRENCH
- 8" ABOVE GROUND GAS COLLECTION HEADER
- 1 1/2" CONDENSATE DRAIN LINE
- INLINE VALVE (SEE DETAIL 4/6)
- REDUCER
- FLANGE (SEE DETAIL 6/6)
- FLANGE WITH BLIND FLANGE (SEE DETAIL 6/6)
- A GAS COLLECTION HEADER TRENCH SECTION

SEE RECORD CONSTRUCTION HEADER ROUTE SURVEY DATA, DWS 2, FOR HEADER ROUTE LAYOUT, GRID COORDINATES, STATIONING, ELEVATIONS, PIPE SLOPES, DEPTH AND FITTINGS.

ABOVE GRADE HEADER PIPING TO BE REMOVED OR INSTALLED PER LANDFILL FILLING/PHASING OPERATIONS. AT LEAST ONE SIDE OF THE HEADER SHOULD BE CONNECTED AT ANY ONE TIME.



RECORD CONSTRUCTION DRAWINGS

PRINTED: MAR 01 1993

REVIEW

| REV. | DATE | DESCRIPTION | DR BY | APP BY |
|------|------|-------------|-------|--------|
| | | | | |
| | | | | |
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| | | | | |

| | |
|-----------------------|------------------|
| DES BY: LWS | APP BY: JAG |
| DR BY: TLA/SAM | SCALE: 1" = 100' |
| CHK BY: MWR | FEBRUARY 1993 |
| APP BY: JAG | DRAWING NO. 1 |
| WET PROJECT NO: 92212 | SHEET 2 OF 14 |

WET PROJECT NO: 92212
GAS COLLECTION SYSTEM
BRIDGETON SANITARY LANDFILL
RECORD CONSTRUCTION
WELL AND HEADER LAYOUT



RECORD CONSTRUCTION HEADER ROUTE SURVEY DATA

SEE DRAWING 1 FOR PLAN VIEW OF HEADER SYSTEM LAYOUT

Main table with columns: STATION (E/F), GRID COORDINATES (North, East), HEADER INVERT ELEV. (Ft), GROUND/ELEV. DEPTH (Ft), HEADER SLOPE (%), CONSTRUCTION NOTES, PIPE INFORMATION.

Table with columns: STATION (E/F), GRID COORDINATES (North, East), HEADER INVERT ELEV. (Ft), GROUND/ELEV. DEPTH (Ft), HEADER SLOPE (%), CONSTRUCTION NOTES, PIPE INFORMATION.

Main table with columns: STATION (E/F), GRID COORDINATES (North, East), HEADER INVERT ELEV. (Ft), GROUND/ELEV. DEPTH (Ft), HEADER SLOPE (%), CONSTRUCTION NOTES, PIPE INFORMATION.

Table with columns: STATION (E/F), GRID COORDINATES (North, East), HEADER INVERT ELEV. (Ft), GROUND/ELEV. DEPTH (Ft), HEADER SLOPE (%), CONSTRUCTION NOTES, PIPE INFORMATION.

PIPE SCHEDULE

PIPE FOOTAGE SUMMARY

Summary table with columns: GAS LINE, 4", 8", 12", 18", TOTAL. Total pipe footage: 6304.

WELL SCHEDULE

Table with columns: WELL ID, GRID COORDINATES (North, East), GROUND ELEV. (Ft), BOTTOM OF WELL ELEV. (Ft), WELL DEPTH (Ft), SLOTTED PIPE (Ft), S.I.D PIPE (Ft).

CONTROL POINT

Table with columns: STATION (E/F), GRID COORDINATES (North, East), HEADER INVERT ELEV. (Ft), GROUND/ELEV. DEPTH (Ft), HEADER SLOPE (%), CONSTRUCTION NOTES, PIPE INFORMATION.

RECORD CONSTRUCTION NOTES

- 1. THE LANDFILL GAS COLLECTION HEADER PIPING IS CONSTRUCTED OF HIGH DENSITY POLYETHYLENE (HDPE) PIPE...
2. ALL POLYETHYLENE (PE) PIPE IS BUTT FUSED...
3. ALL REDUCERS ARE CONSTRUCTED ADJACENT TO MAINLINE AND/OR LATERAL TEES...
4. INDICATED LENGTHS FOR PIPE SECTIONS ARE MEASURED THROUGH CENTERLINES OF TEES AND REDUCERS...
5. ALL PIPING BENDS SHOWN IN PLANS ARE PIPE FIELD BENDS EXCEPT WHERE FITTINGS ARE INDICATED...
6. EXISTING BASE TOPOGRAPHY WITH LANDFILL SITE GRID COORDINATES PROVIDED BY LANDFILL WASTE SYSTEMS, INC.
7. ELEVATIONS ARE USGS MEAN SEA LEVEL DATUM. CONTOUR INTERVAL IS 2 FT.

REVIEW

Revision table with columns: REV, DATE, DESCRIPTION, DR BY, APP BY.

RECORD CONSTRUCTION DRAWINGS

PRINTED: MAR 01 1993

NET PROJECT NO. 92212

GAS COLLECTION SYSTEM BRIDGETON SANITARY LANDFILL

SHEET TITLE: RECORD CONSTRUCTION

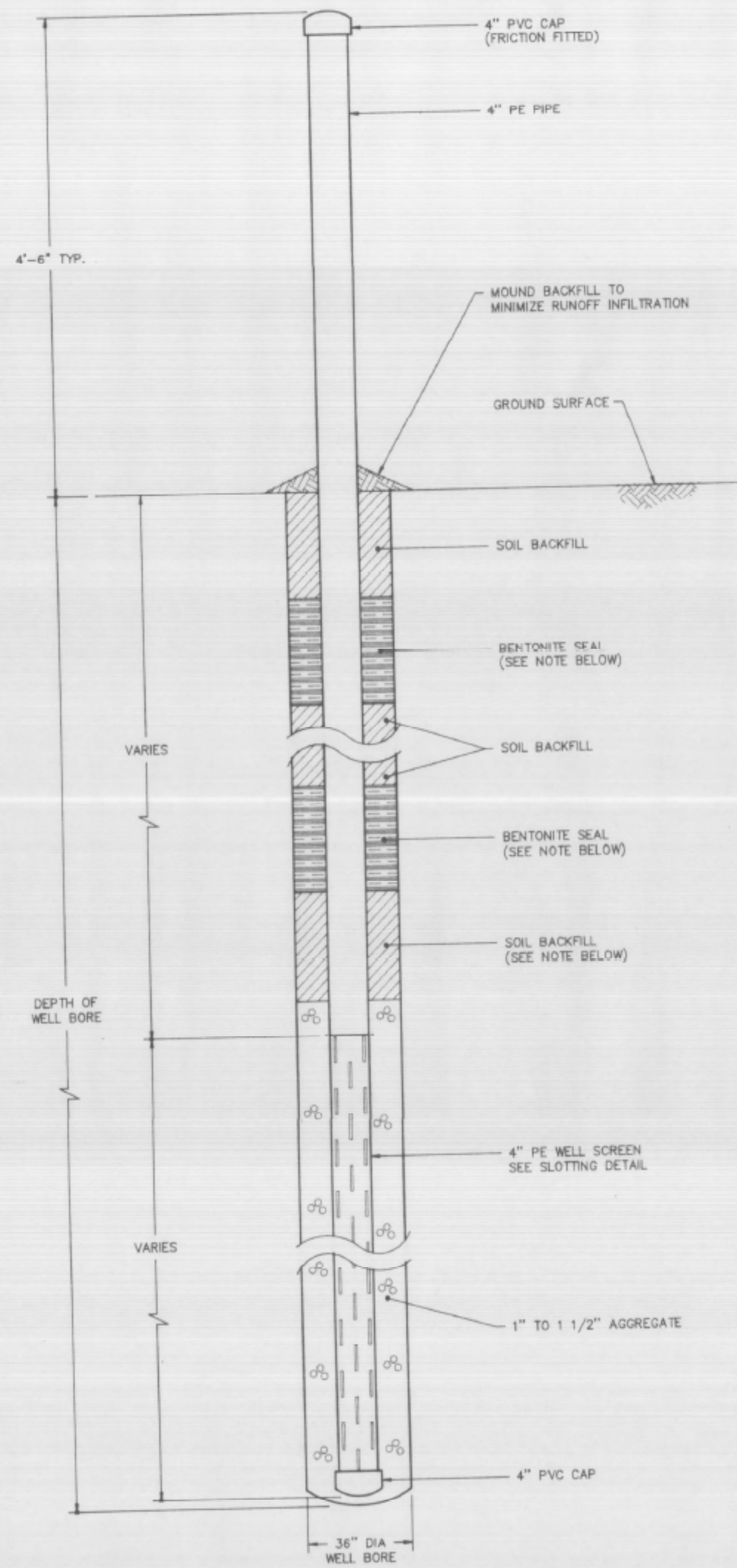
HEADER ROUTE SURVEY DATA

SCALE: NONE

FEBRUARY 1993

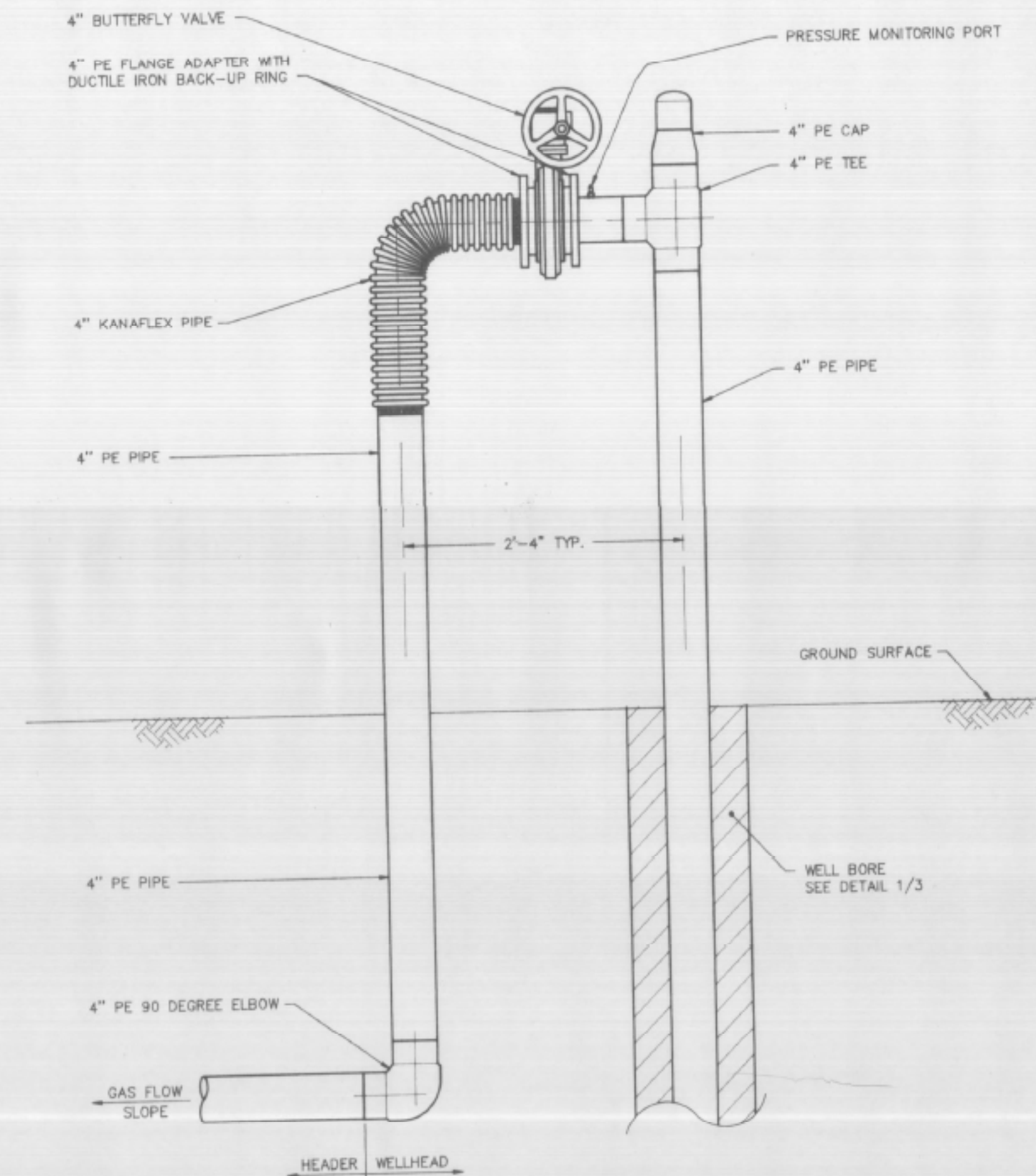
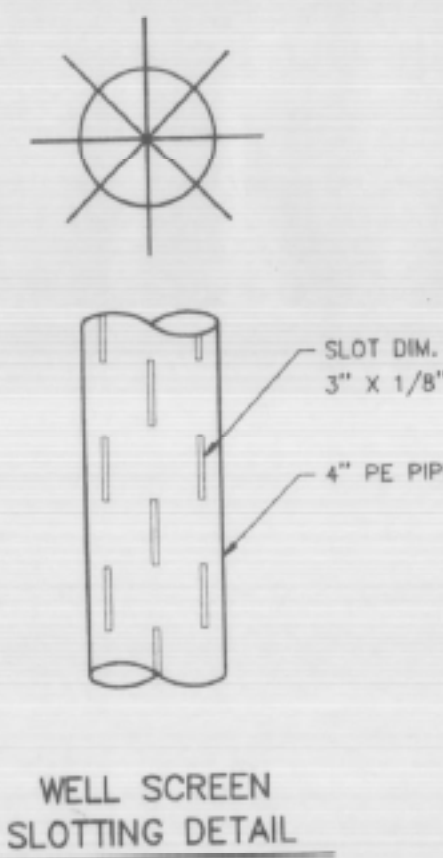
DRAWING NO. 2

SHEET 3 OF 14



1
3 GAS EXTRACTION WELL BORE DETAIL
NTS

NOTE: SEE RECORD DOCUMENTATION REPORT FOR INDIVIDUAL WELL CONSTRUCTION LOGS



2
3 GAS EXTRACTION WELLHEAD DETAIL
NTS

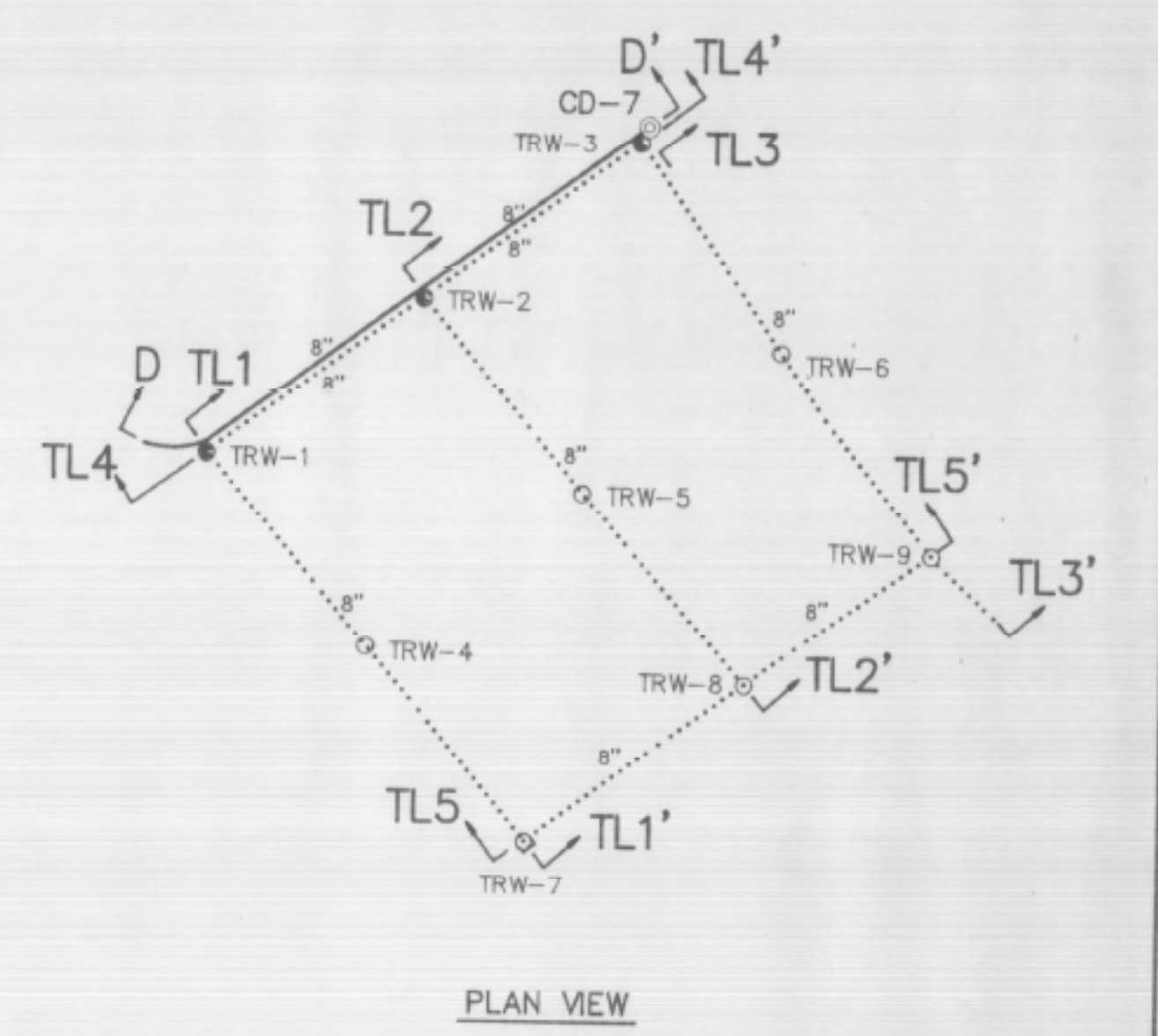
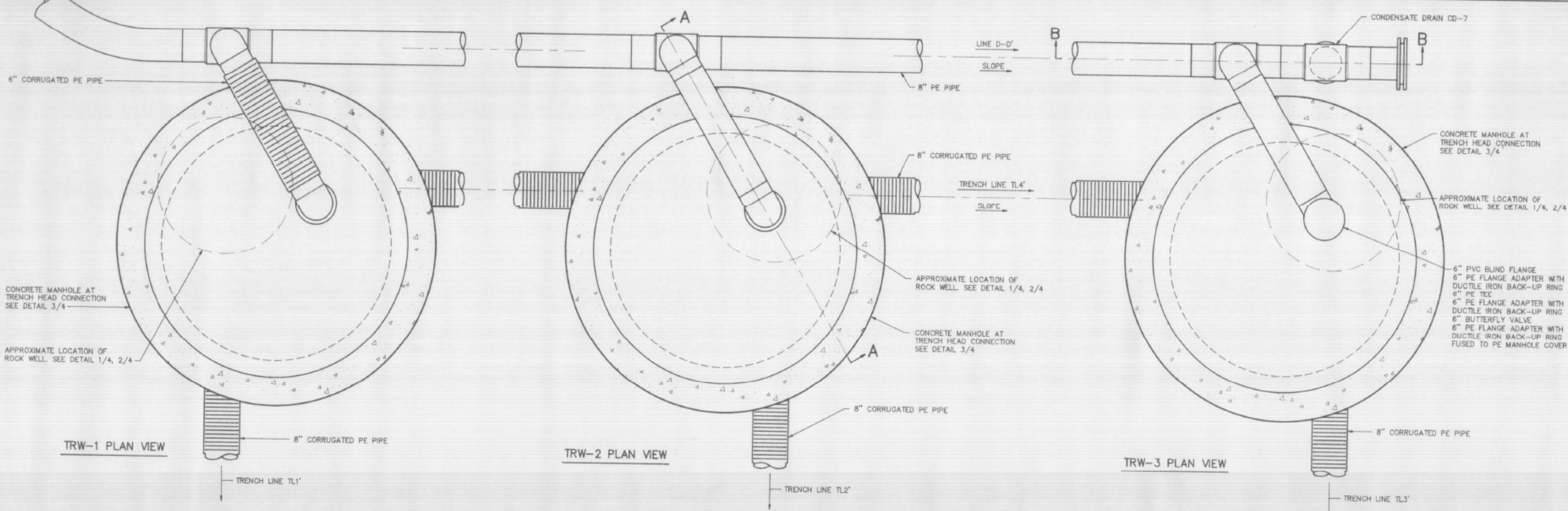
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RECORD
CONSTRUCTION
DRAWINGS

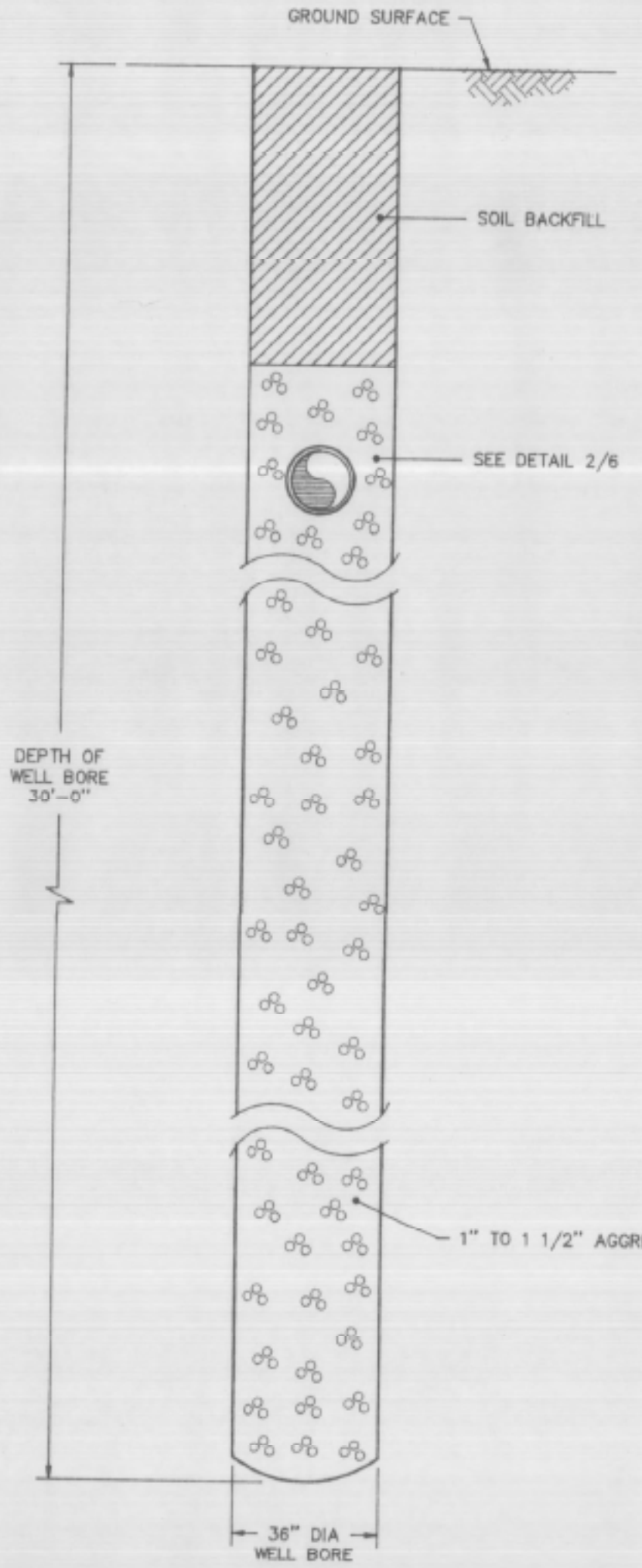
PRINTED: MAR 01 1993

REVIEW

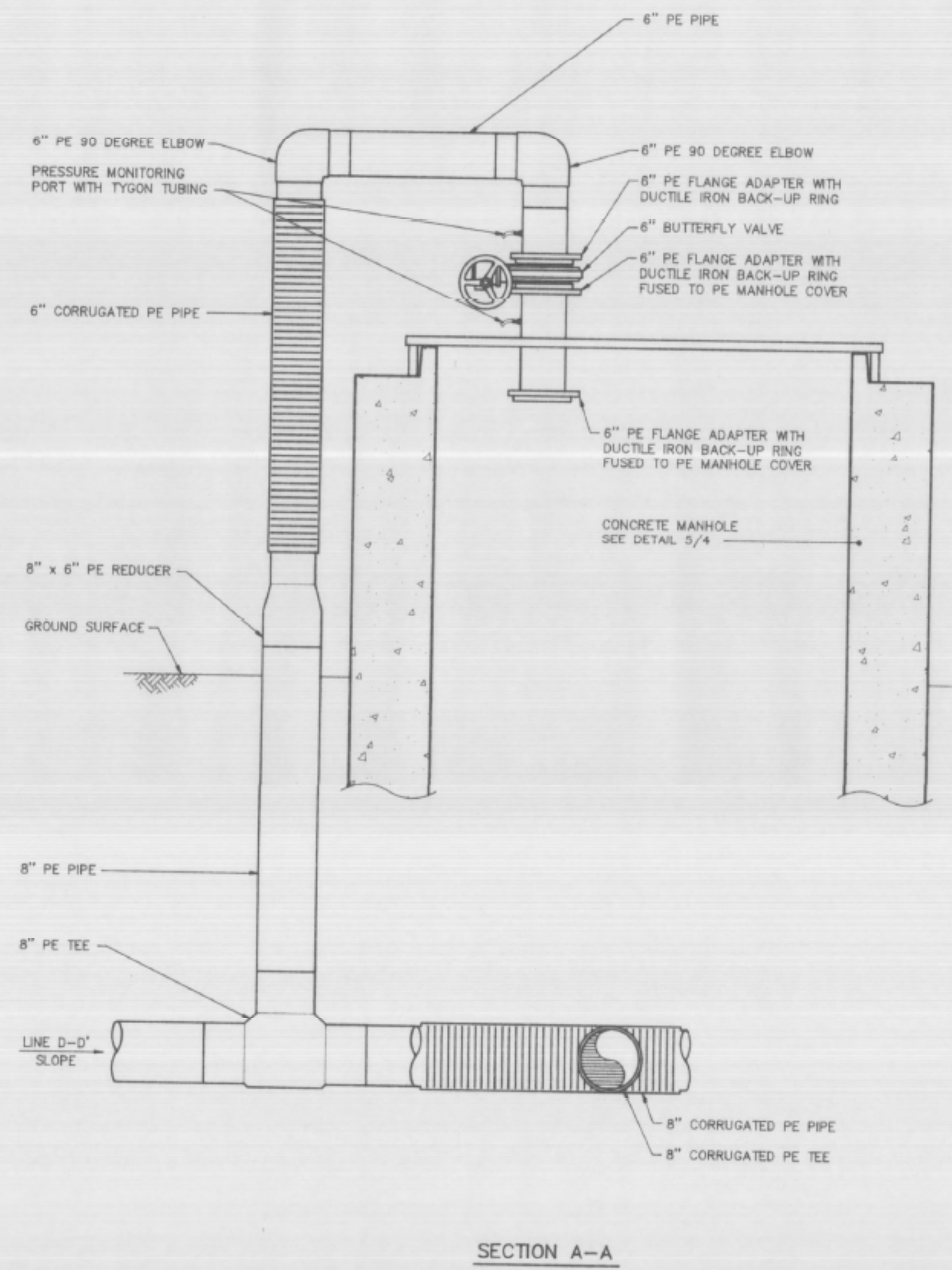
| REV. | DATE | DESCRIPTION | DR BY | APP BY |
|-----------------------------|------|-------------|---------------|--------|
| | | | DR BY | LWS |
| | | | DR BY | SAM |
| | | | CHK BY | MWR |
| | | | APP BY | JAG |
| SCALE: NONE | | | | |
| NET PROJECT NO. 92212 | | | | |
| GAS COLLECTION SYSTEM | | | | |
| BRIDGETON SANITARY LANDFILL | | | JANUARY 1993 | |
| DRAWING NO. 3 | | | | |
| WELL AND WELLHEAD DETAILS | | | SHEET 4 OF 14 | |



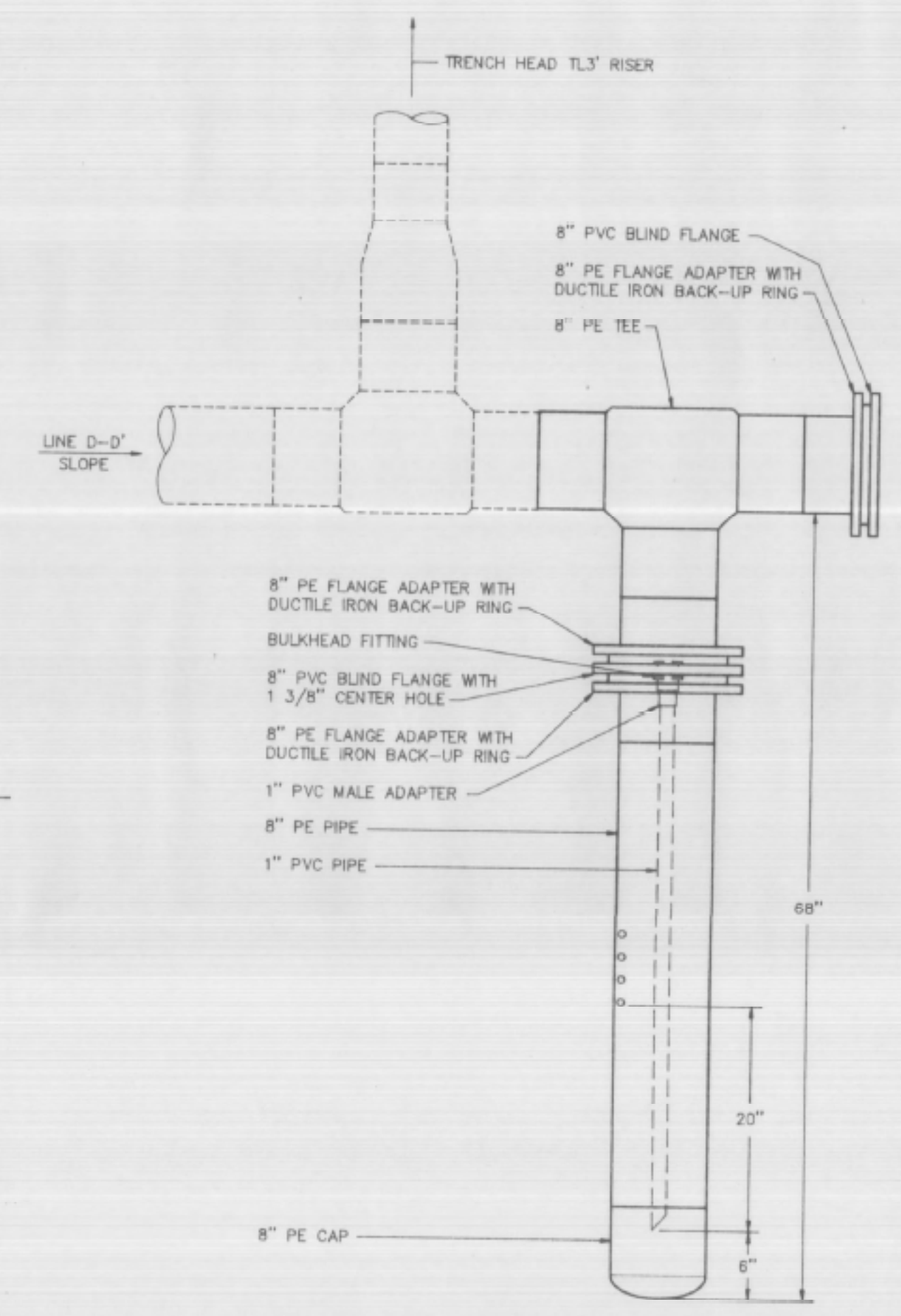
① ④ TRENCH HEADER LAYOUT
NTS
NOTE: SEE DRAWING 1 FOR TOTAL SYSTEM LAYOUT



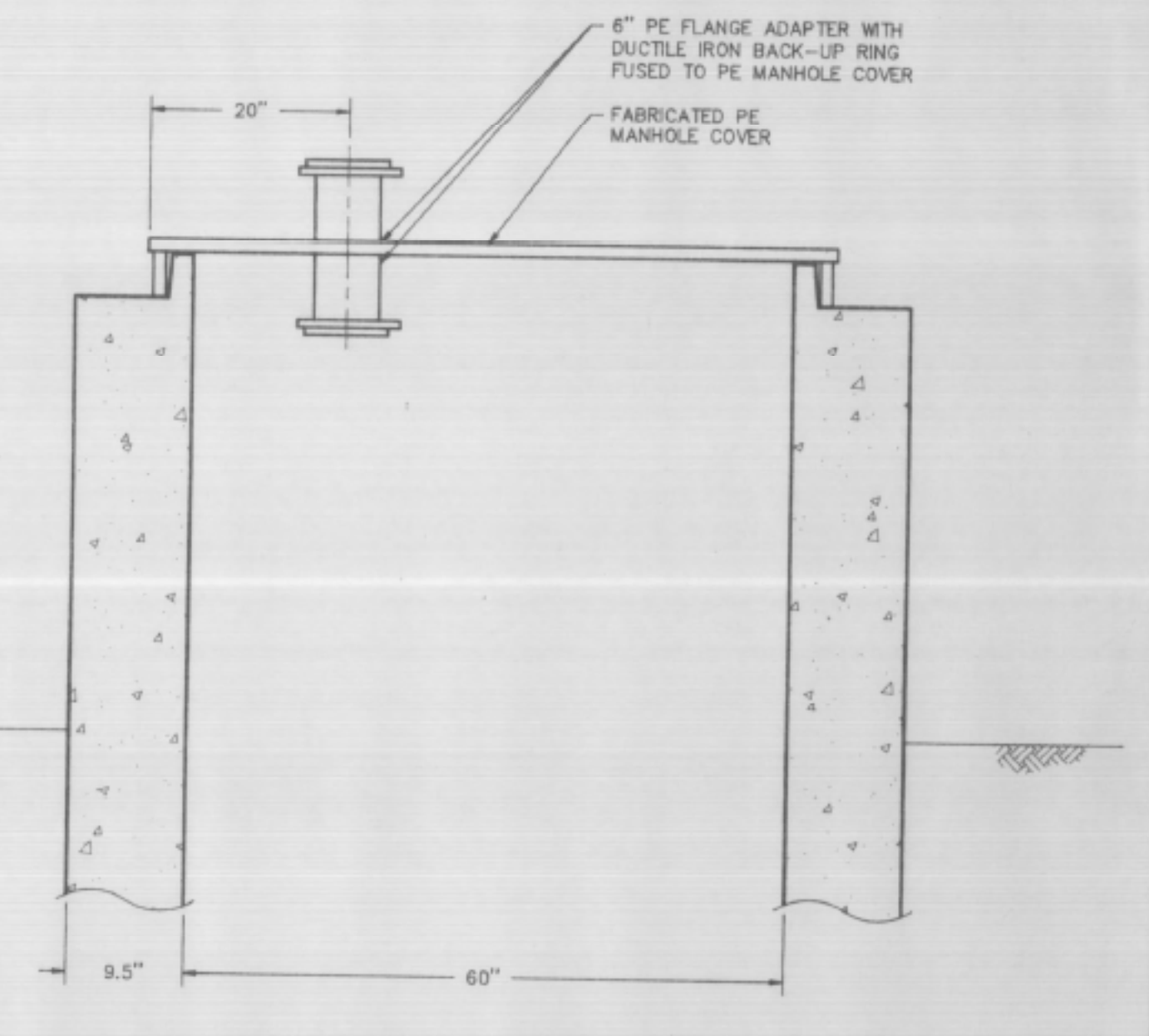
② ④ TRENCH ROCK WELL BORE DETAIL
NTS
NOTE: SEE DETAIL 1/4 FOR LOCATION OF TRW SERIES WELLS



③ ④ TRENCH HEAD CONNECTION
NTS



④ ④ CONDENSATE DRAIN CD-7
NTS



⑤ ④ MANHOLE DETAIL
NTS

SEE RECORD CONSTRUCTION HEADER ROUTE SURVEY DATA, DWG 2, FOR HEADER ROUTE LAYOUT, GRID COORDINATES, STATIONING, ELEVATIONS, PIPE SLOPES, DEPTH AND FITTINGS.

RECORD CONSTRUCTION DRAWINGS

PRINTED: MAR 01 1993

| REV. | DATE | DESCRIPTION | DR BY | APP BY |
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WASTE ENERGY TECHNOLOGY, INCORPORATED
DESIGNERS & CONTRACTORS
FT. WALTER BEACH, FLORIDA

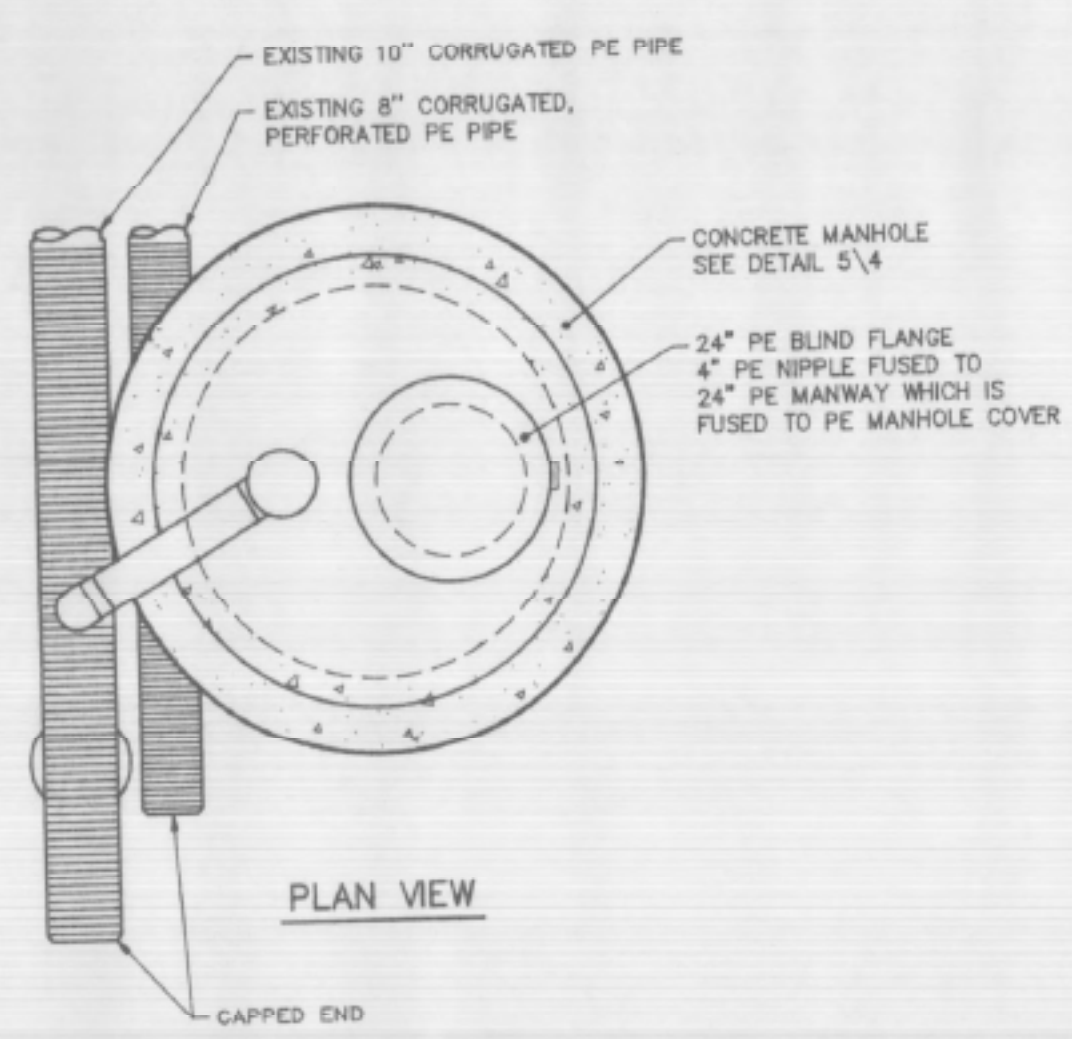
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GAS COLLECTION SYSTEM
BRIDGETON SANITARY LANDFILL

DES BY: LWS
DR BY: SAM
CHK BY: MWR
APP BY: JAC

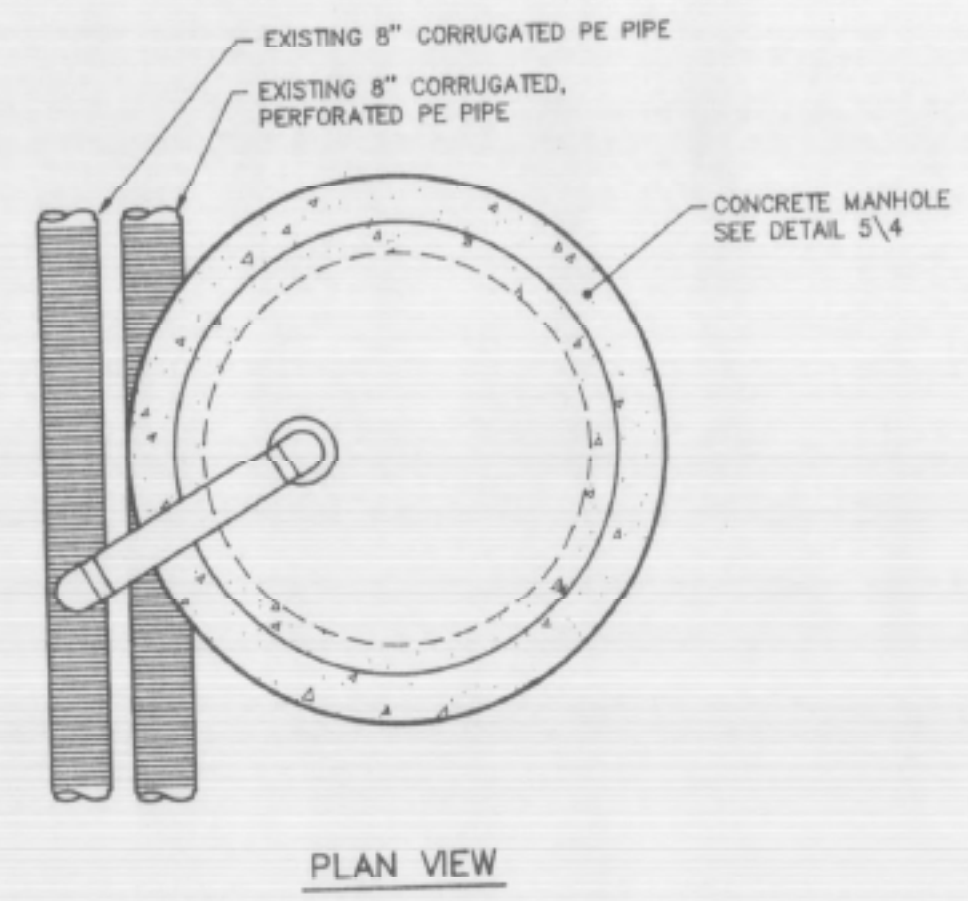
SCALE: NO SCALE
JANUARY 1993

SHEET TITLE: TRENCH HEAD DETAILS
DRAWING NO. 4
SHEET 5 OF 14

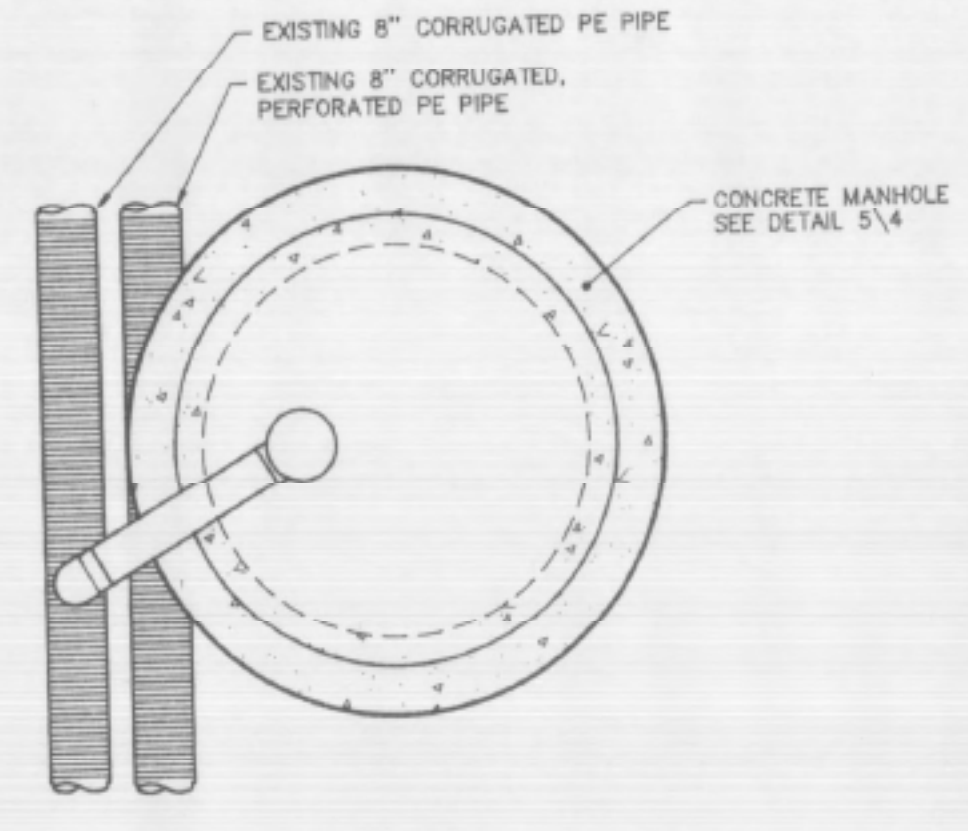
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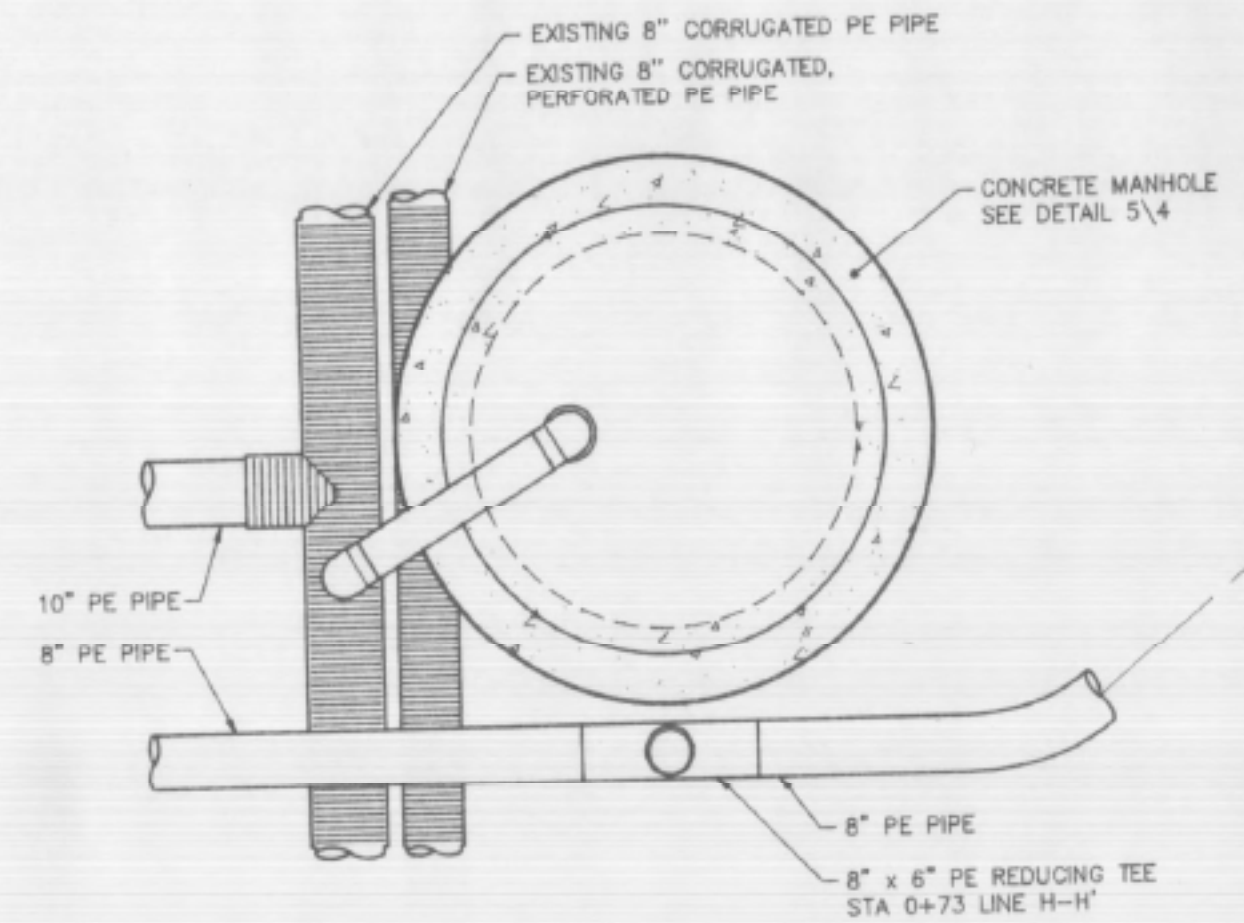
PLAN VIEW



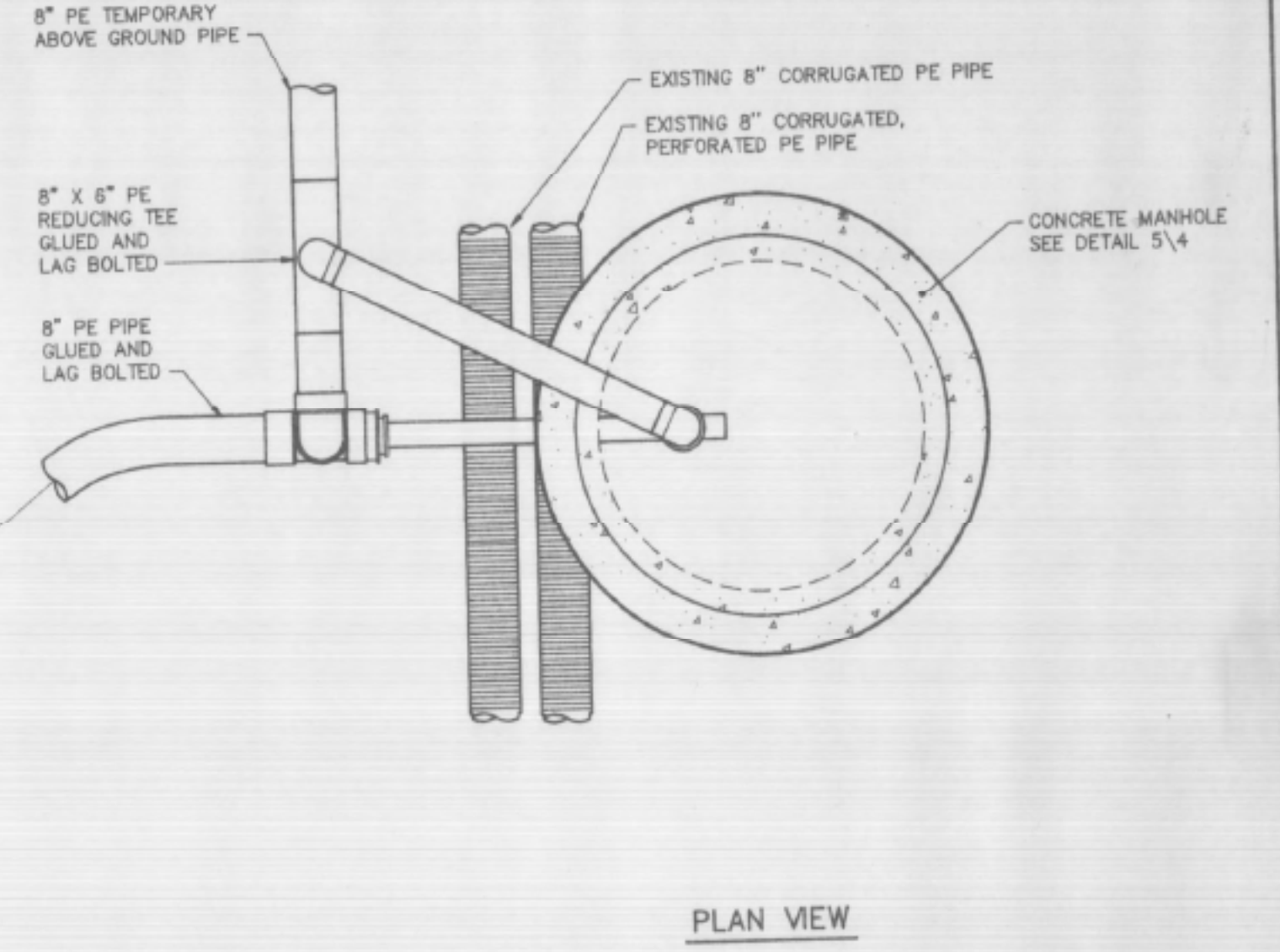
PLAN VIEW



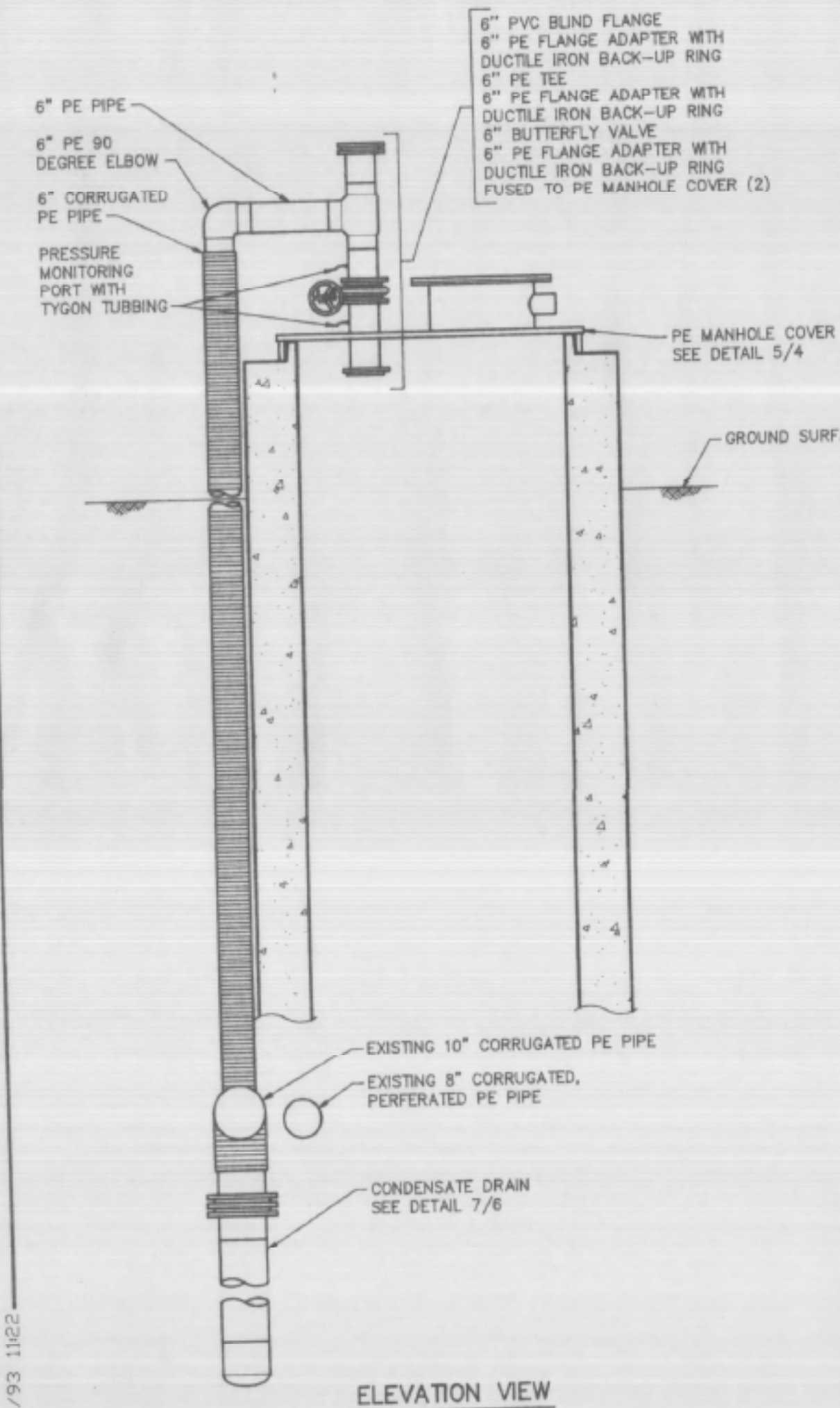
PLAN VIEW



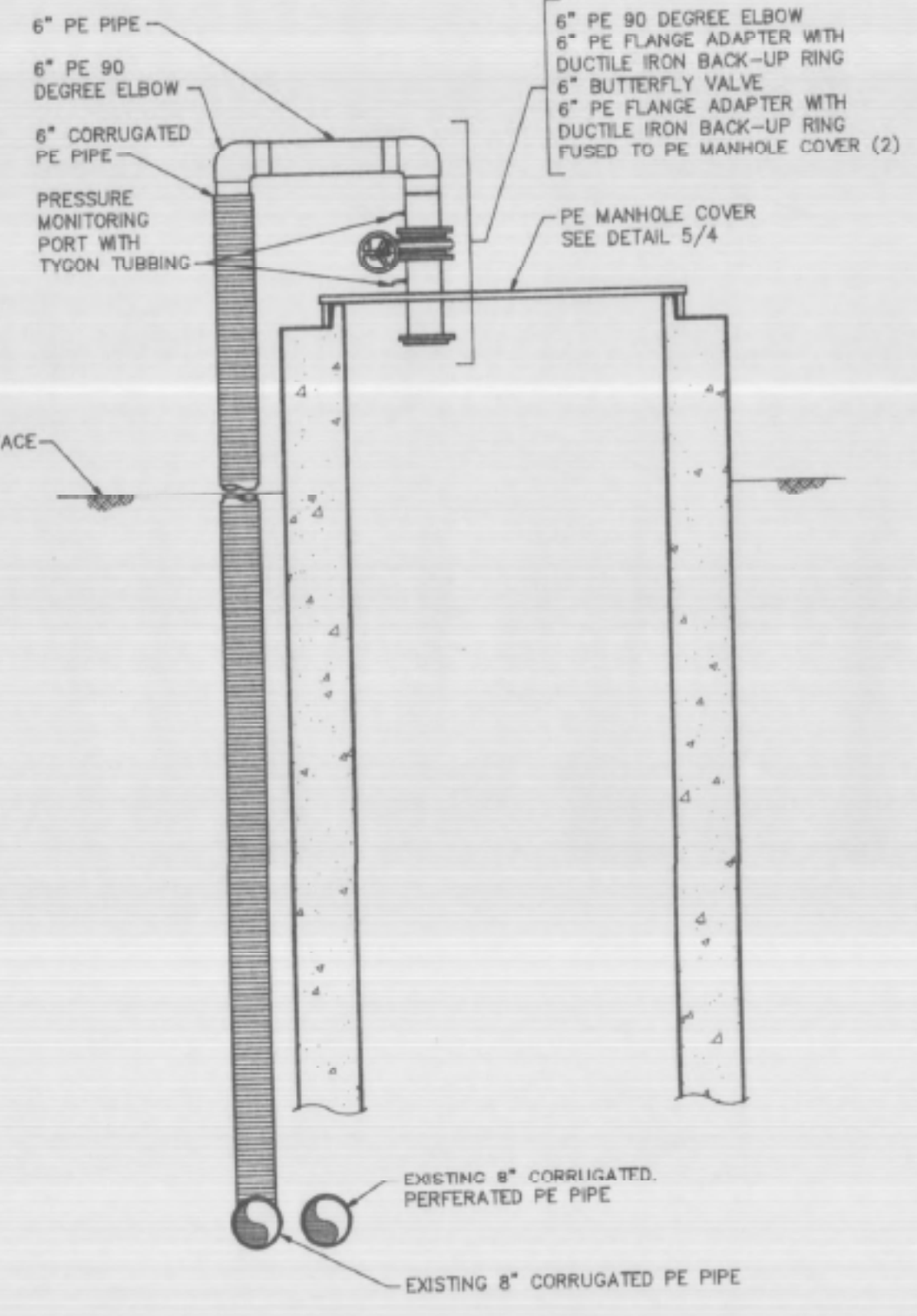
PLAN VIEW



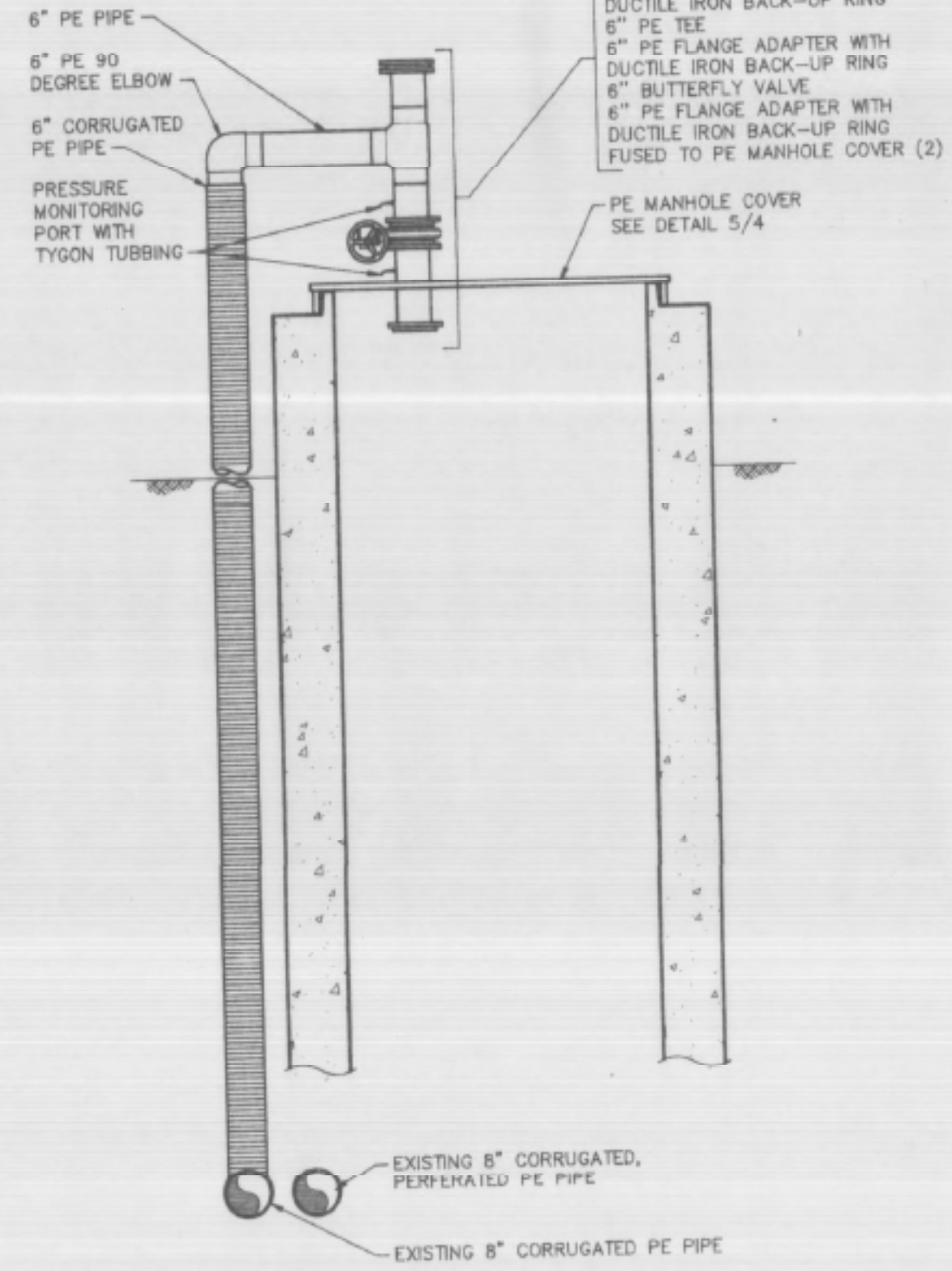
PLAN VIEW



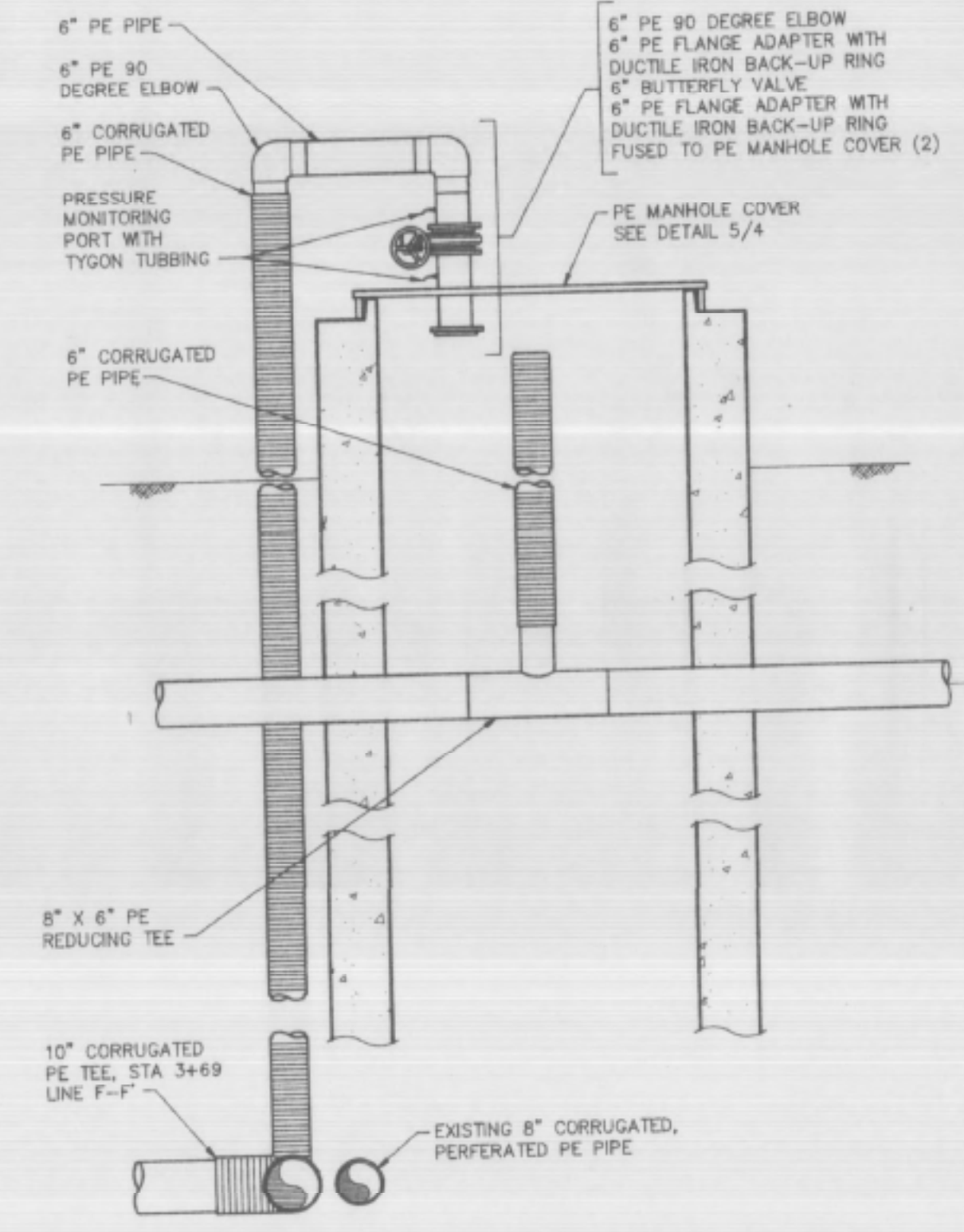
ELEVATION VIEW



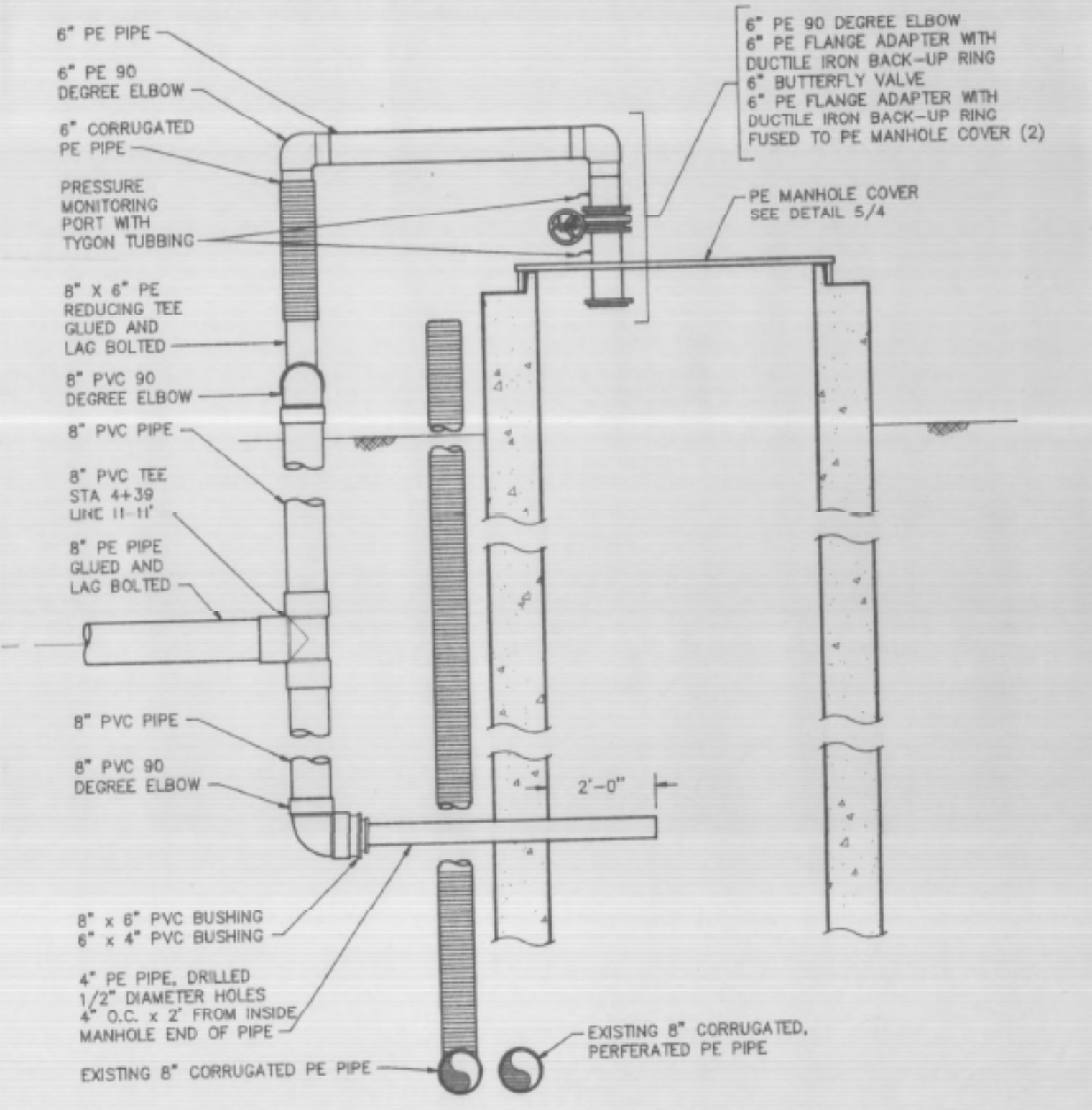
ELEVATION VIEW



ELEVATION VIEW



ELEVATION VIEW



ELEVATION VIEW

1 LCS-1 MANHOLE DETAIL
NTS

2 MANHOLE DETAIL
NTS
LOCATED AT GC-1, GC-2, GC-3, GC-4, AND TRW-1

3 MANHOLE DETAIL
NTS
LOCATED AT LCS-2, LCS-3, LCS-4 AND TRW-3

4 GC-1 MANHOLE DETAIL
NTS

5 GC-2 MANHOLE DETAIL
NTS

SEE RECORD CONSTRUCTION HEADER ROUTE SURVEY DATA, DWG 2, FOR HEADER ROUTE LAYOUT, GRID COORDINATES, STATIONING, ELEVATIONS, PIPE SLOPES, DEPTH AND FITTINGS.

RECORD CONSTRUCTION DRAWINGS

PRINTED: MAR 01 1993

| REV. | DATE | DESCRIPTION | DR BY | APP BY |
|------|------|-------------|-------|--------|
| | | | LWS | |
| | | | SAM | |
| | | | MWR | |
| | | | JAG | |

SCALE: NONE

WET PROJECT NO. 92212
GAS COLLECTION SYSTEM
BRIDGETON SANITARY LANDFILL

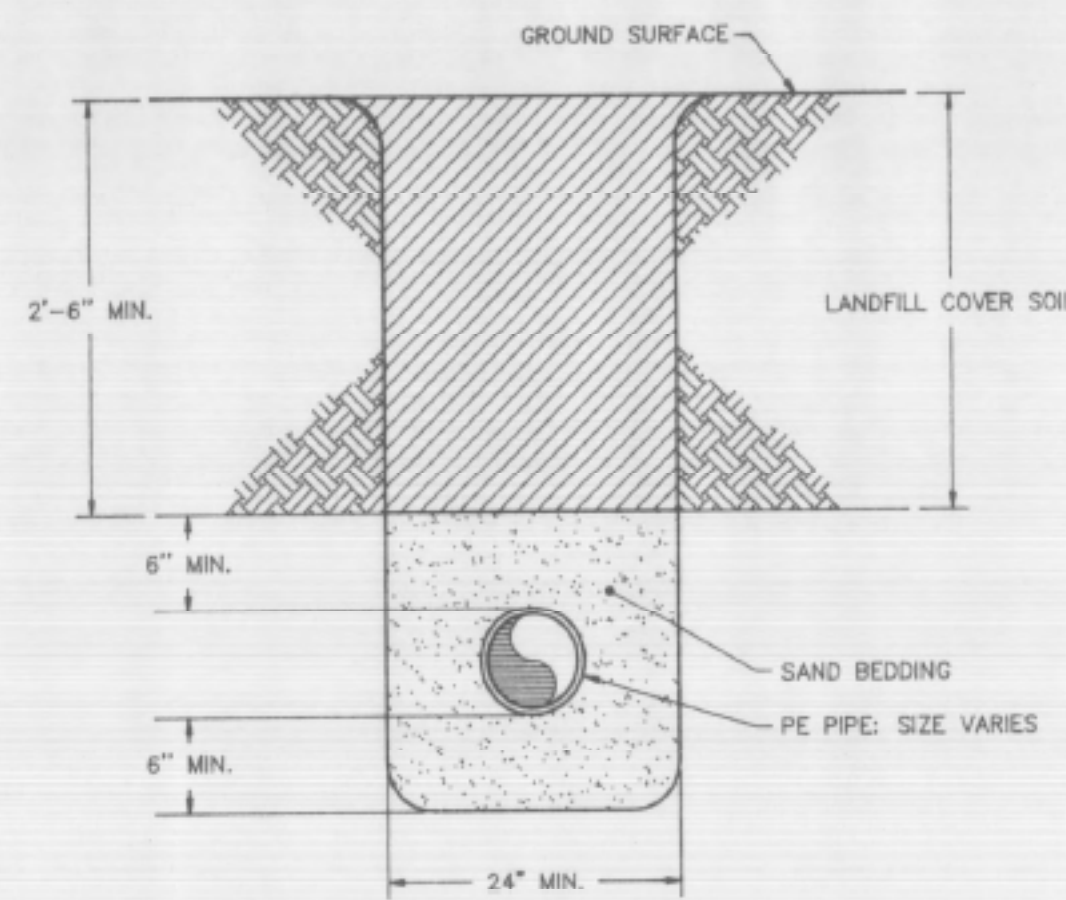
ENVIRONMENTAL MANAGEMENT ENGINEERS & CONTRACTORS
FT. WALTON BEACH, FLORIDA

FEBRUARY 1993

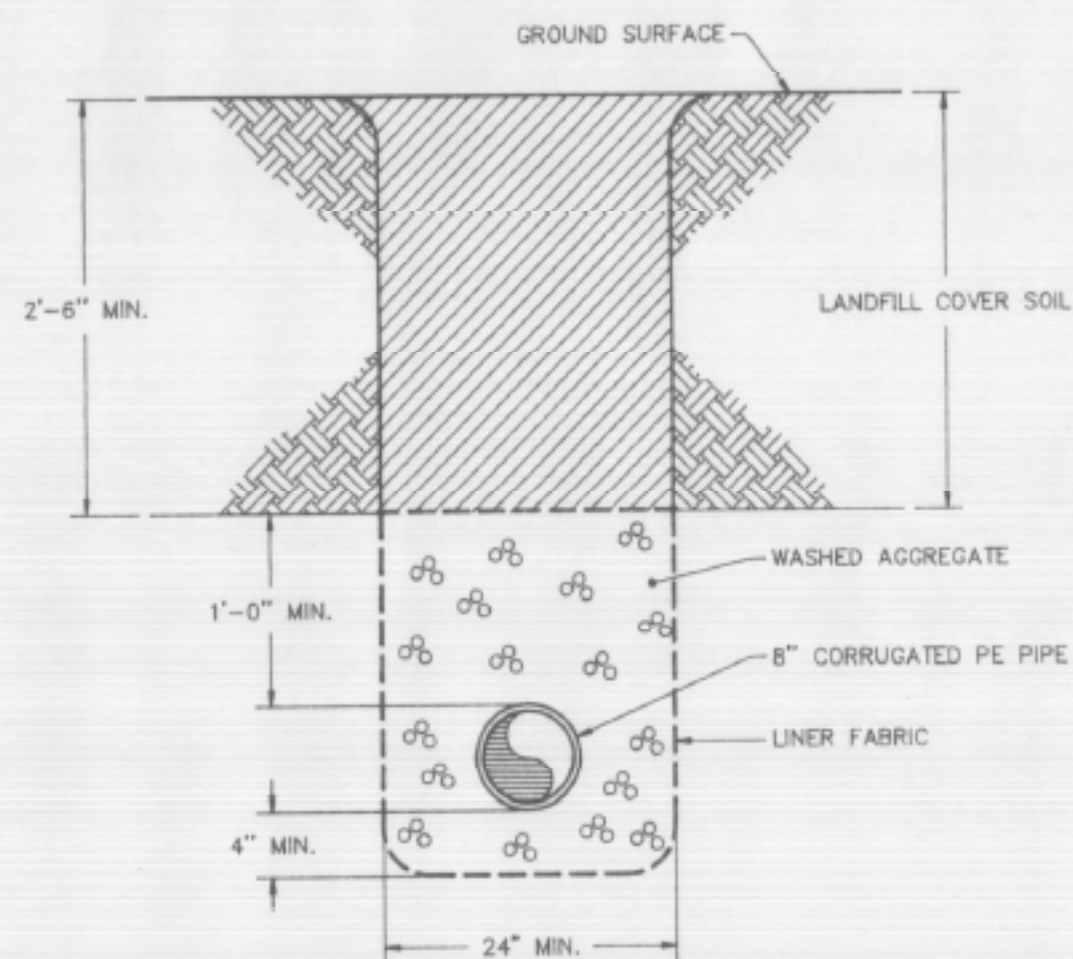
DRAWING NO. 5

SHEET 6 OF 14

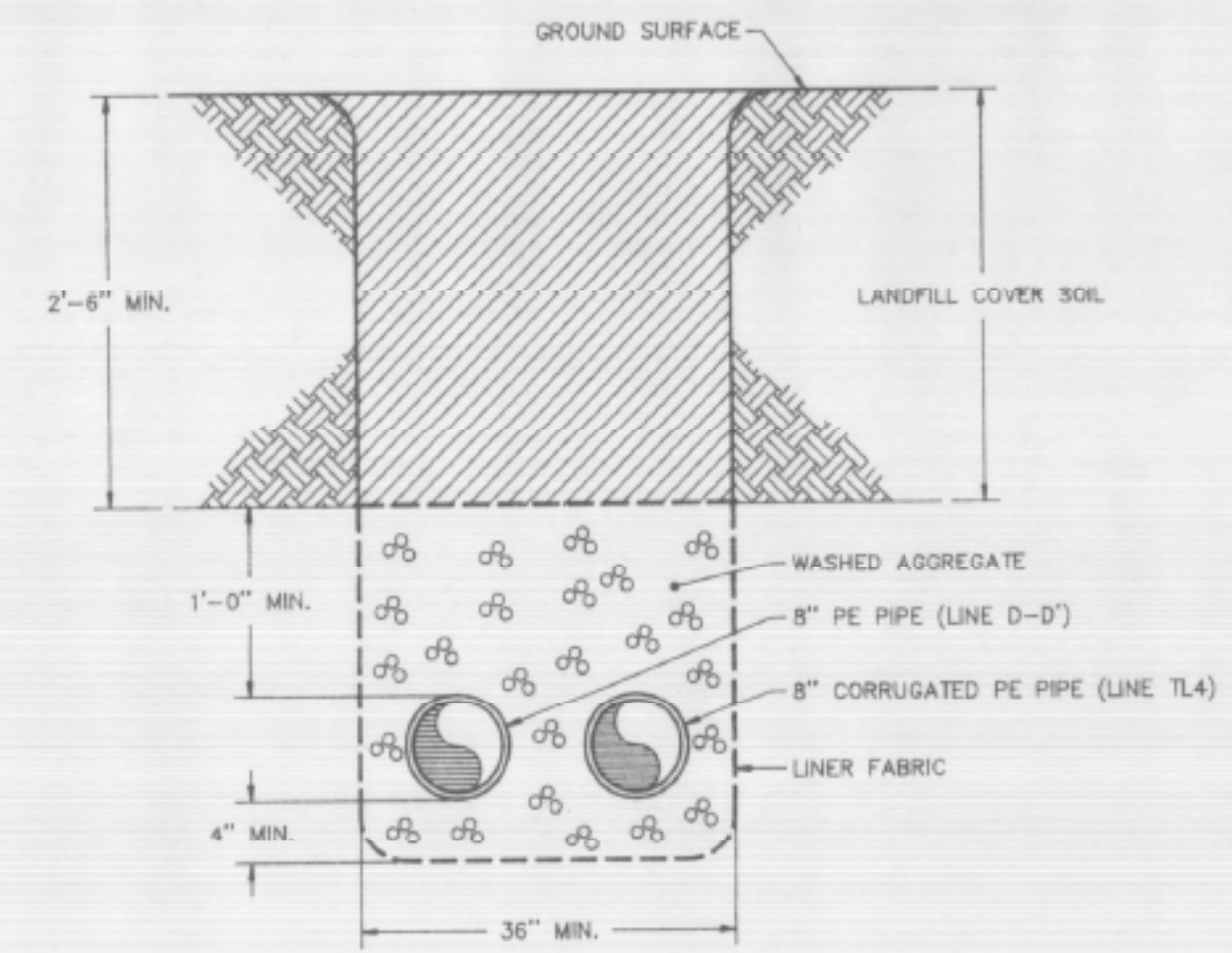
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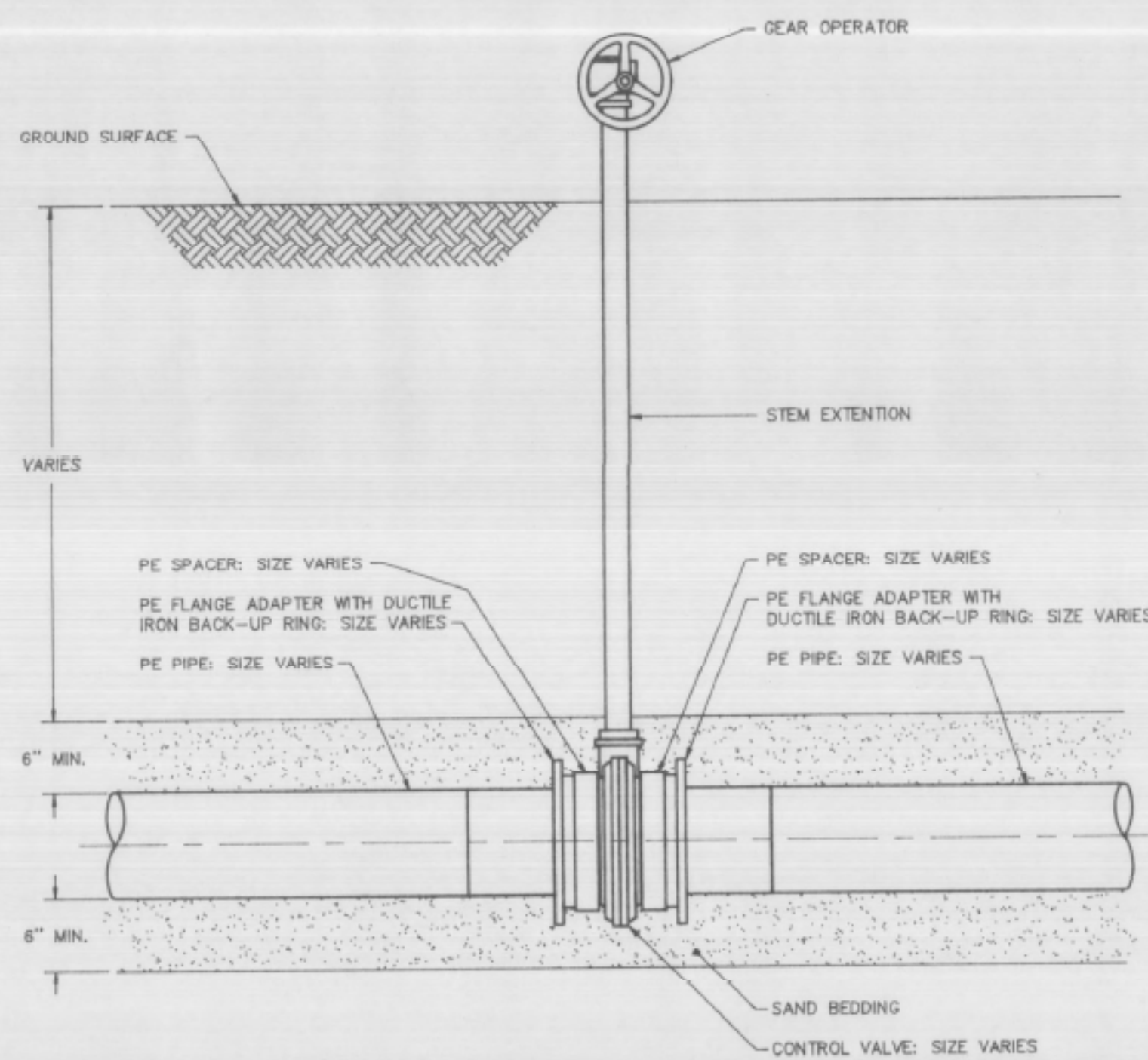
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6 HEADER/LATERAL TRENCH DETAIL
NTS



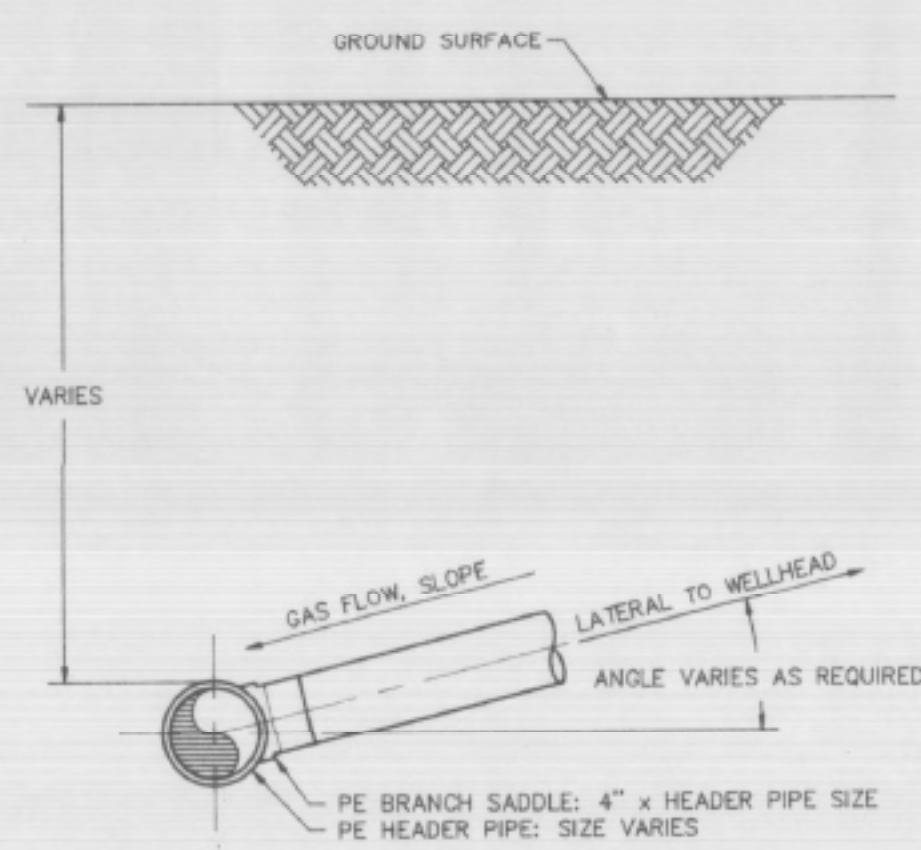
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6 CORRUGATED HEADER TRENCH DETAIL
NTS



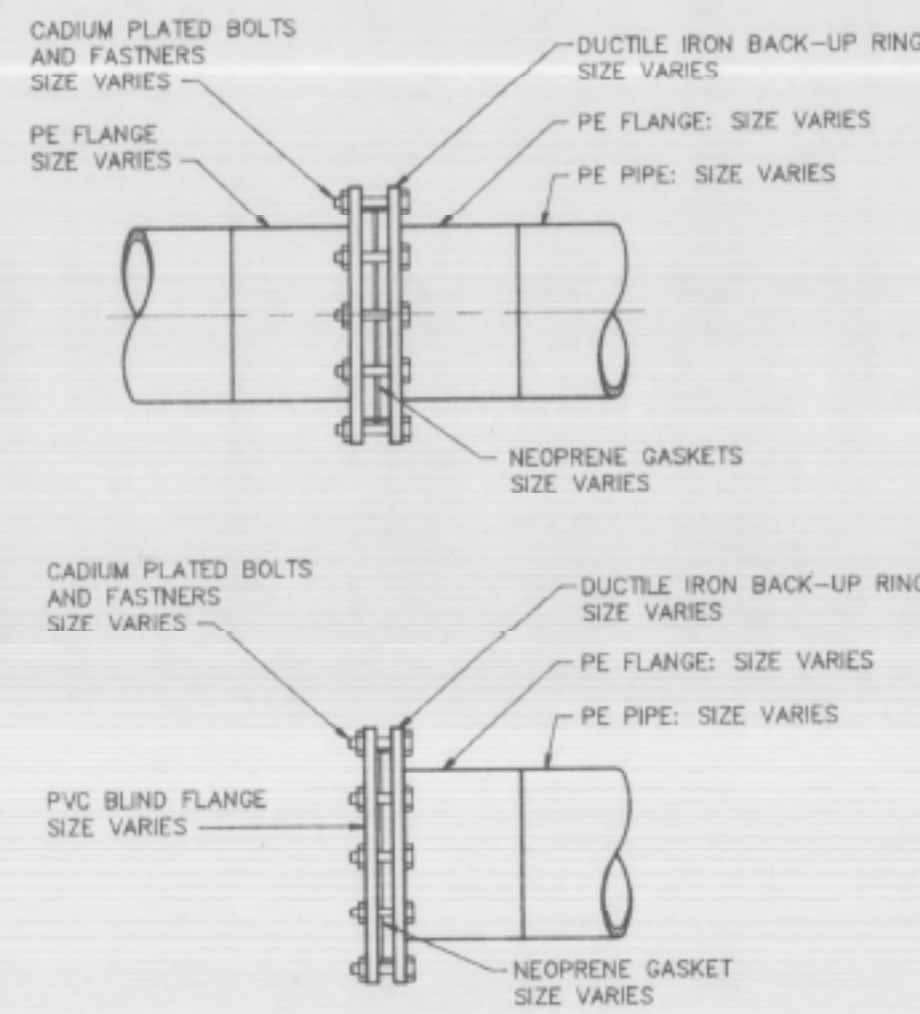
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6 HEADER/CORRUGATED HEADER TRENCH DETAIL
NTS



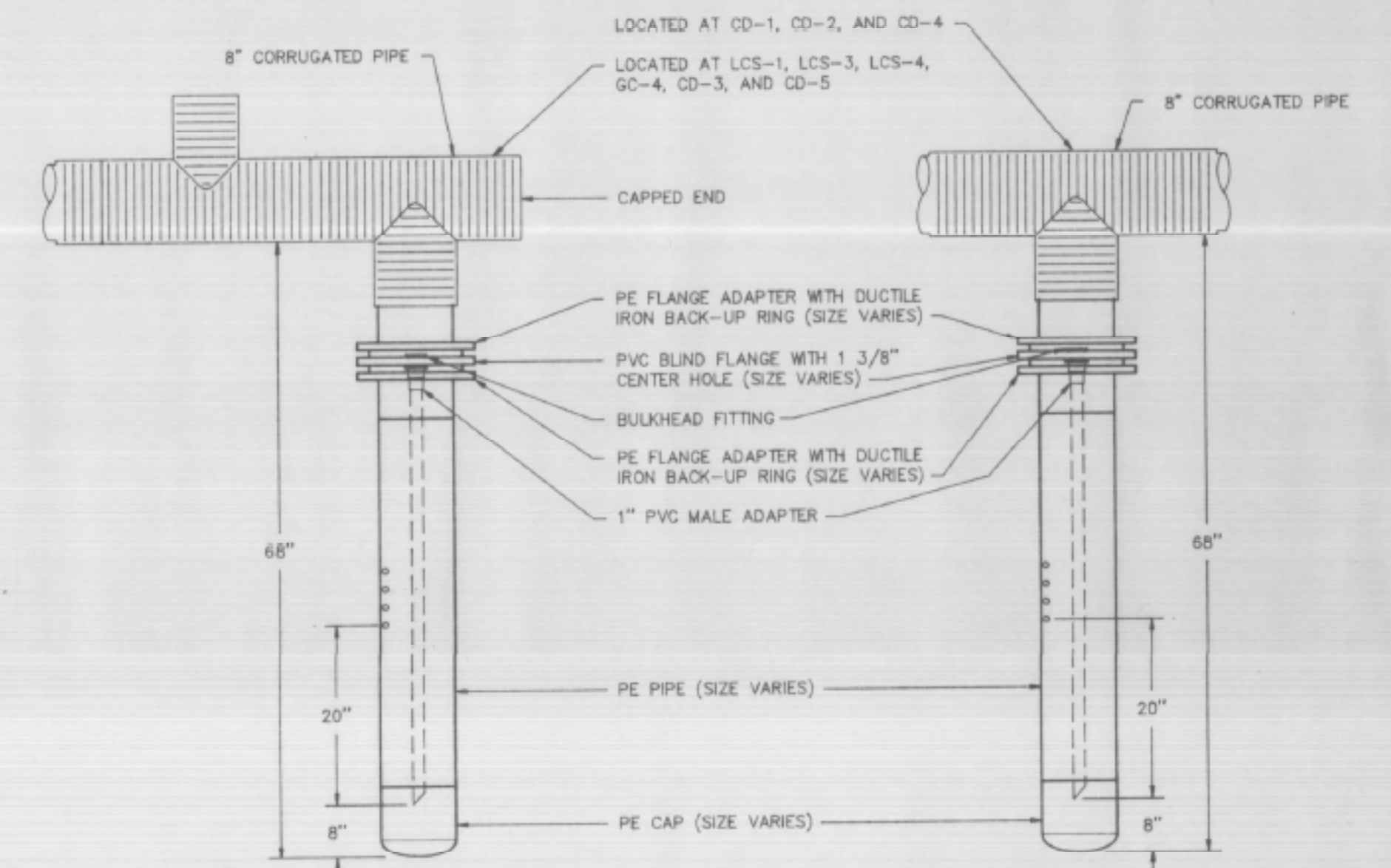
4
6 UNDERGROUND CONTROL VALVE
NTS



5
6 BRANCH SADDLE DETAIL
NTS



6
6 FLANGE DETAIL
NTS



7
6 CONDENSATE DRAIN
NTS

SEE RECORD CONSTRUCTION HEADER ROUTE SURVEY DATA, DWG. 2, FOR HEADER ROUTE LAYOUT, GRID COORDINATES, STATIONING, ELEVATIONS, PIPE SLOPES, DEPTH AND FITTINGS.

RECORD CONSTRUCTION DRAWINGS

PRINTED: MAR 0 1 1995

| REV. | DATE | DESCRIPTION | DR BY | APP BY |
|------|------|-------------|-------|--------|
| | | | | |
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DES BY: LWS
DR BY: SAM
CHK BY: MWR
APP BY: JAG

SCALE: NONE
JANUARY 1993

SHEET TITLE: **HEADER DETAILS**
DRAWING NO. **6**
SHEET 7 OF 14

Attachment 12

1998 drawings entitled "*Bridgeton Landfill, LLC Landfill Gas Recovery System and Leachate Forcemain*" prepared by Midwest Environmental Consultants

BRIDGETON LANDFILL, LLC LANDFILL GAS RECOVERY SYSTEM AND LEACHATE FORCEMAIN

ST. LOUIS COUNTY, MISSOURI



APRIL 1998

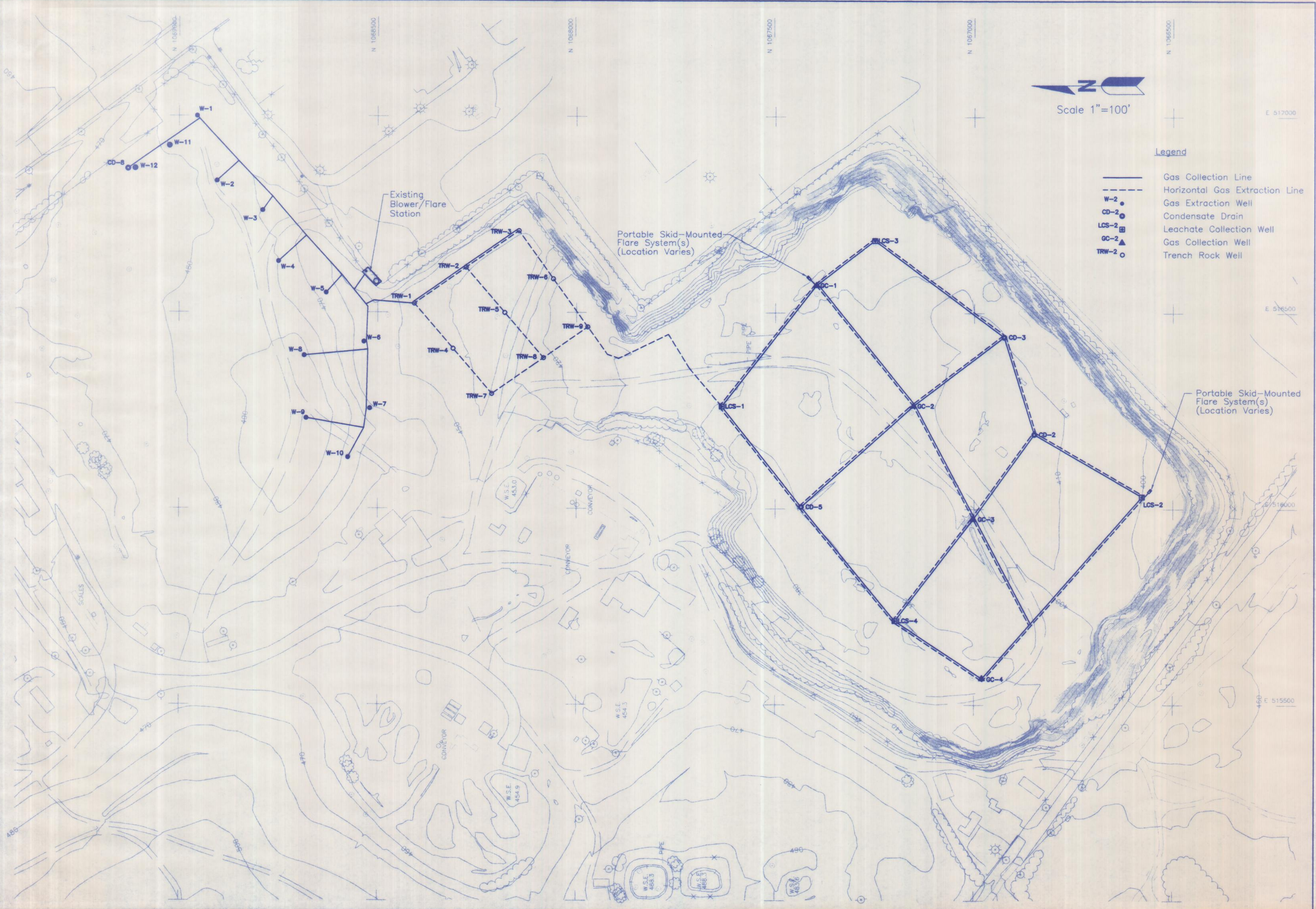
List of Sheets

- ~ Title Sheet
- 1 - Existing Gas Control System
- 2 - Proposed Interim Gas Recovery System
- 3 - Proposed Final Gas Recovery System
- 4 - Gas Header Plan & Profile
- 5 - Leachate Forcemain Plan & Profile
- 6 - Details
- 7 - Details



Midwest Environmental Consultants, P.C.

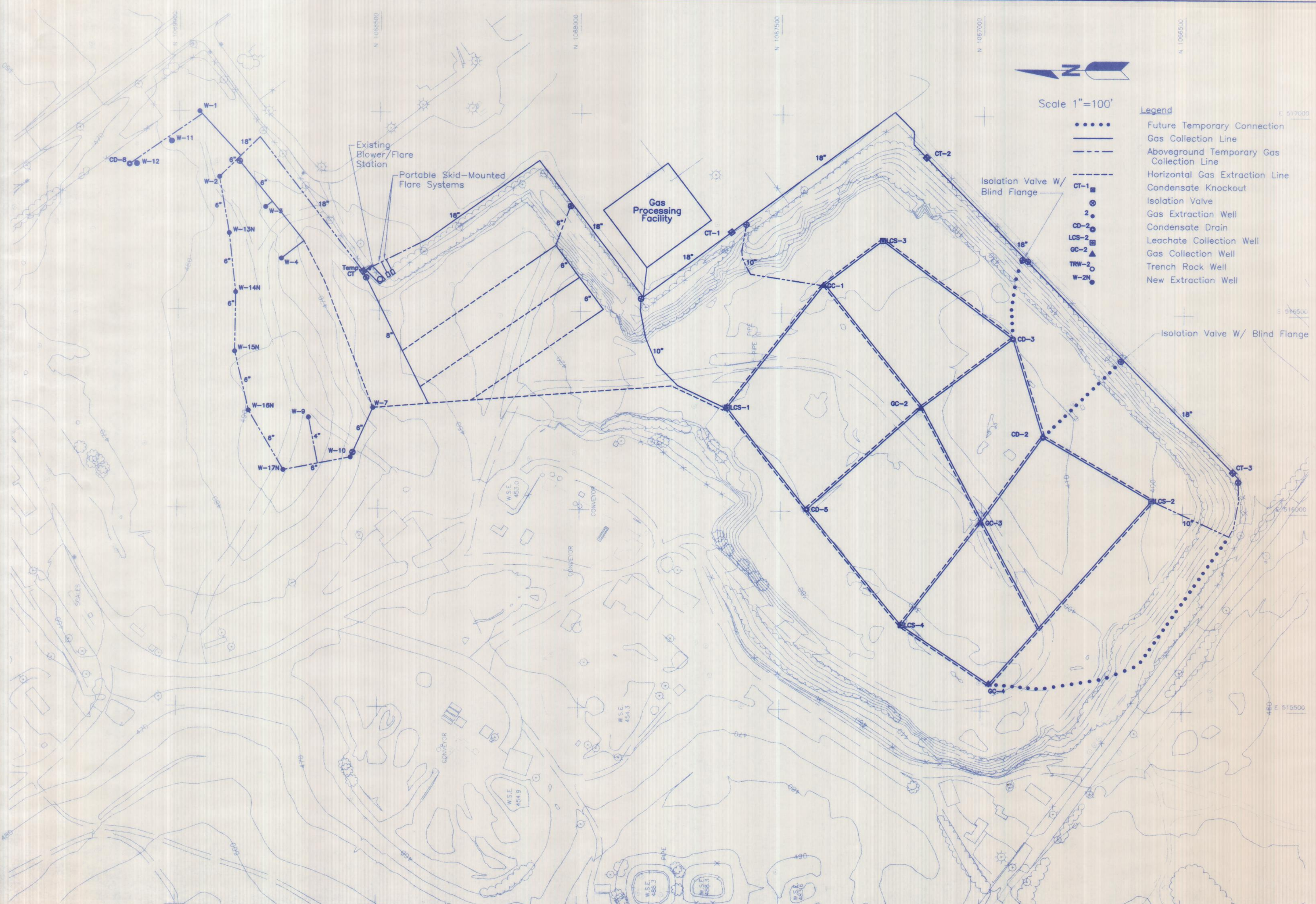
**PROJECT NUMBERS: 960145-003
940130-022**



Legend

- Gas Collection Line
- Horizontal Gas Extraction Line
- W-2 Gas Extraction Well
- CD-2 Condensate Drain
- LCS-2 Leachate Collection Well
- GC-2 Gas Collection Well
- TRW-2 Trench Rock Well

| | | | |
|--|------------------------|--|-------------------|
| Date: 4/98 Scale: 1"=100' Drawn: GSJ Job: 960145-003 File: BES Forc | Date: By Revisions: | MIDWEST ENVIRONMENTAL CONSULTANTS, P.C. | Date: 4/20/98 |
| Bridgeton Landfill, LLC Landfill Gas Recovery System & Leachate Forecmain Existing Gas Control System | | | |
| Sheet 1 Of 7 Sheets | | | |



Scale 1"=100'

Legend

- Future Temporary Connection
- Gas Collection Line
- - - - - Aboveground Temporary Gas Collection Line
- - - - - Horizontal Gas Extraction Line
- CT-1 ■ Condensate Knockout Isolation Valve
- 2 ● Gas Extraction Well
- CD-2 ● Condensate Drain
- LCS-2 ■ Leachate Collection Well
- GC-2 ▲ Gas Collection Well
- TRW-2 ○ Trench Rock Well
- W-2N ● New Extraction Well

E 517000

E 516500

E 515000

E 515500

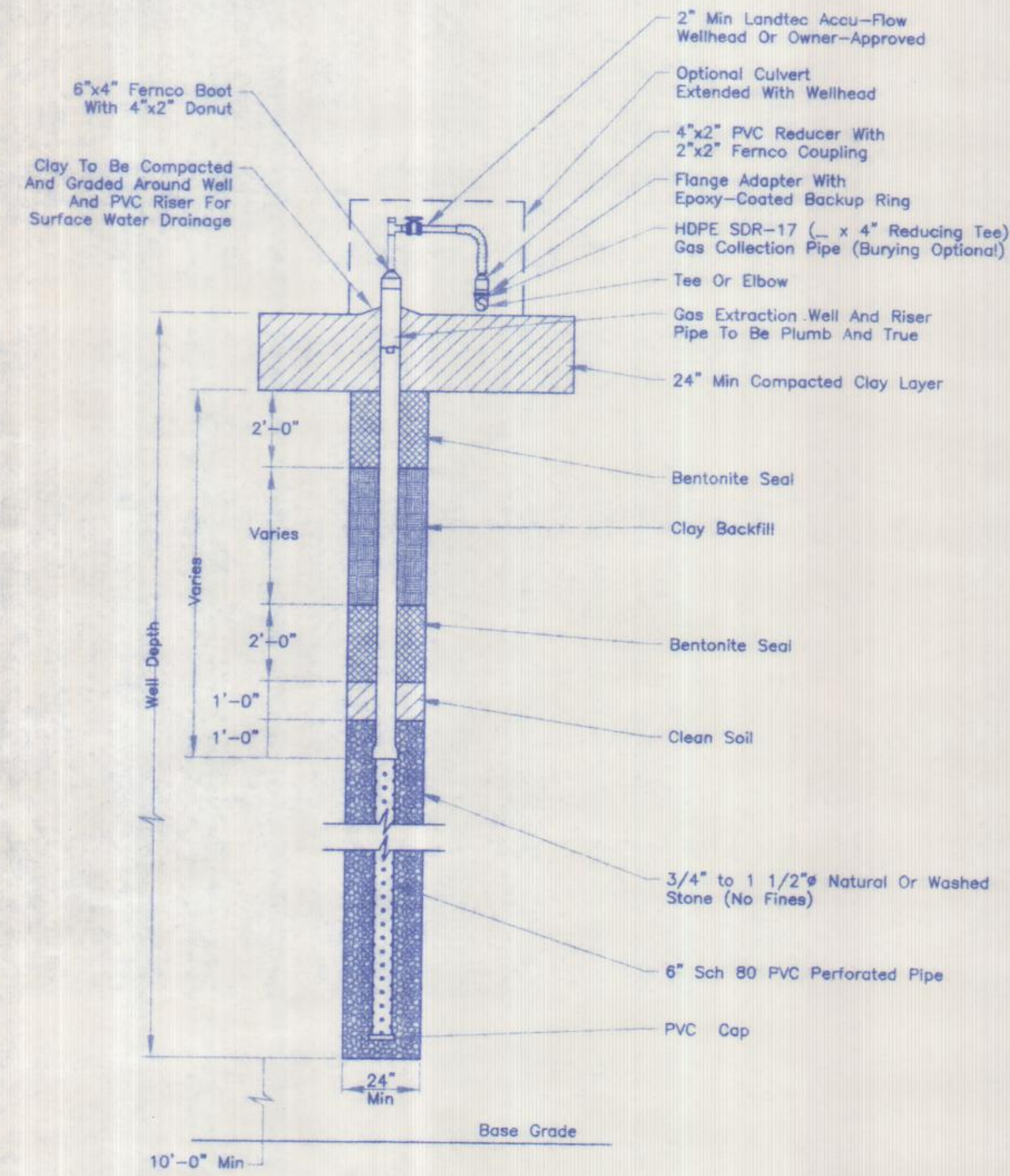
| | |
|------------|--|
| Date: | |
| Revisions: | |

MEC
MIDWEST ENVIRONMENTAL CONSULTANTS, P.C.

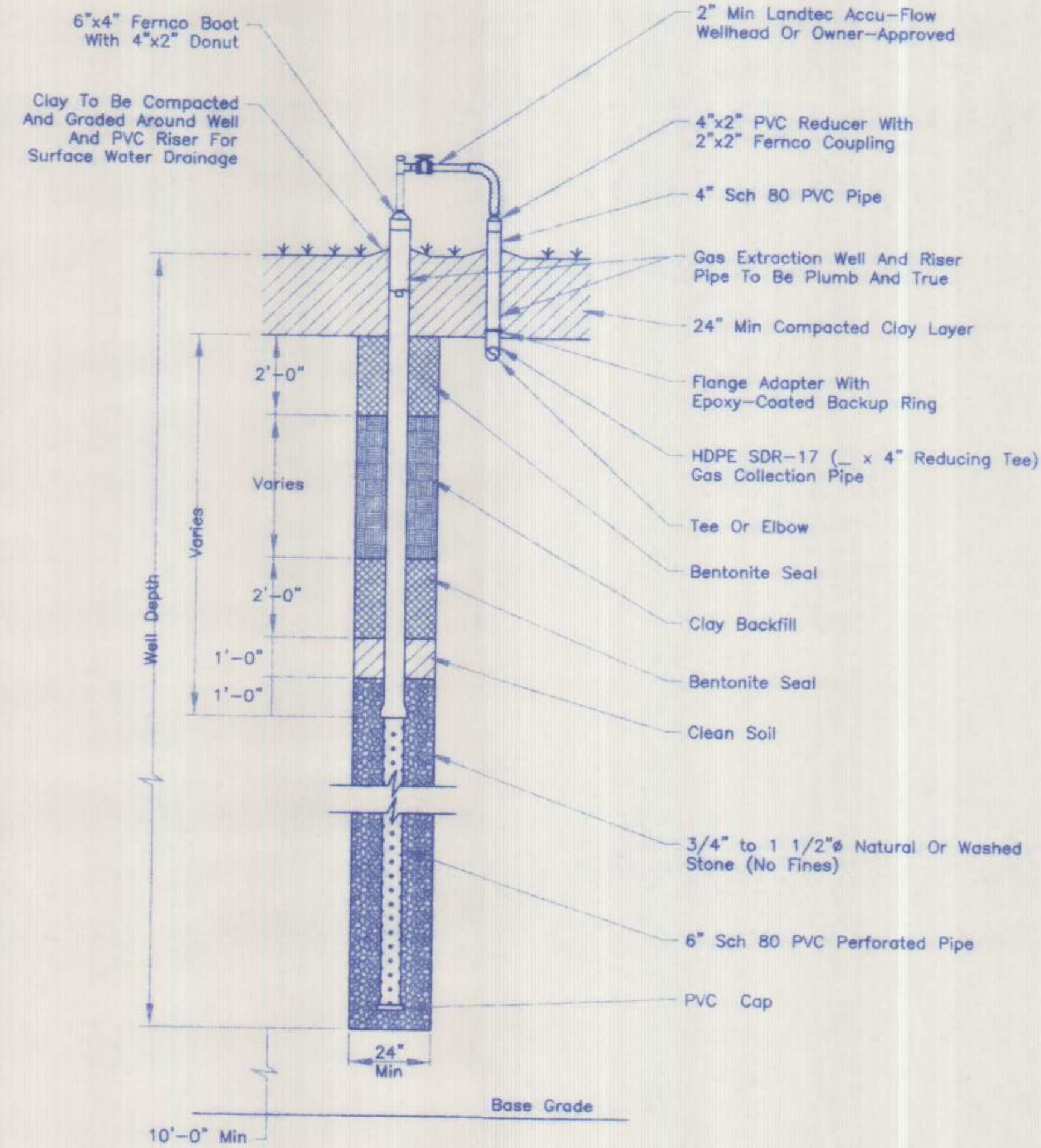


| | |
|--------|-------------|
| Date: | 4/98 |
| Scale: | 1"=100' |
| Drawn: | GSJ |
| Job: | 980145-003 |
| Rev: | BES Force-2 |

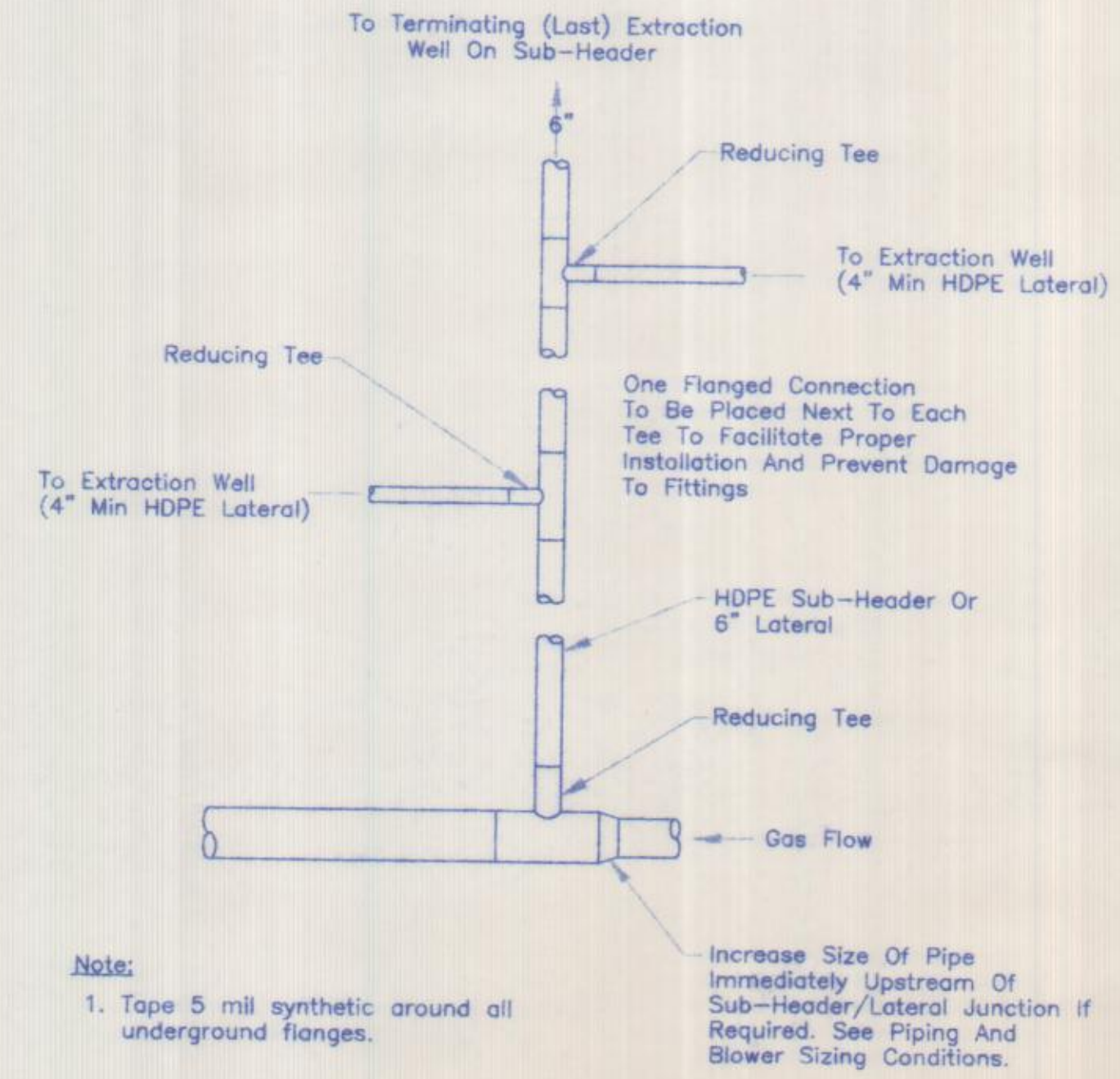
Bridgeton Landfill, LLC
 Landfill Gas Recovery System & Leachate Forcemain
Proposed Interim Gas Recovery System



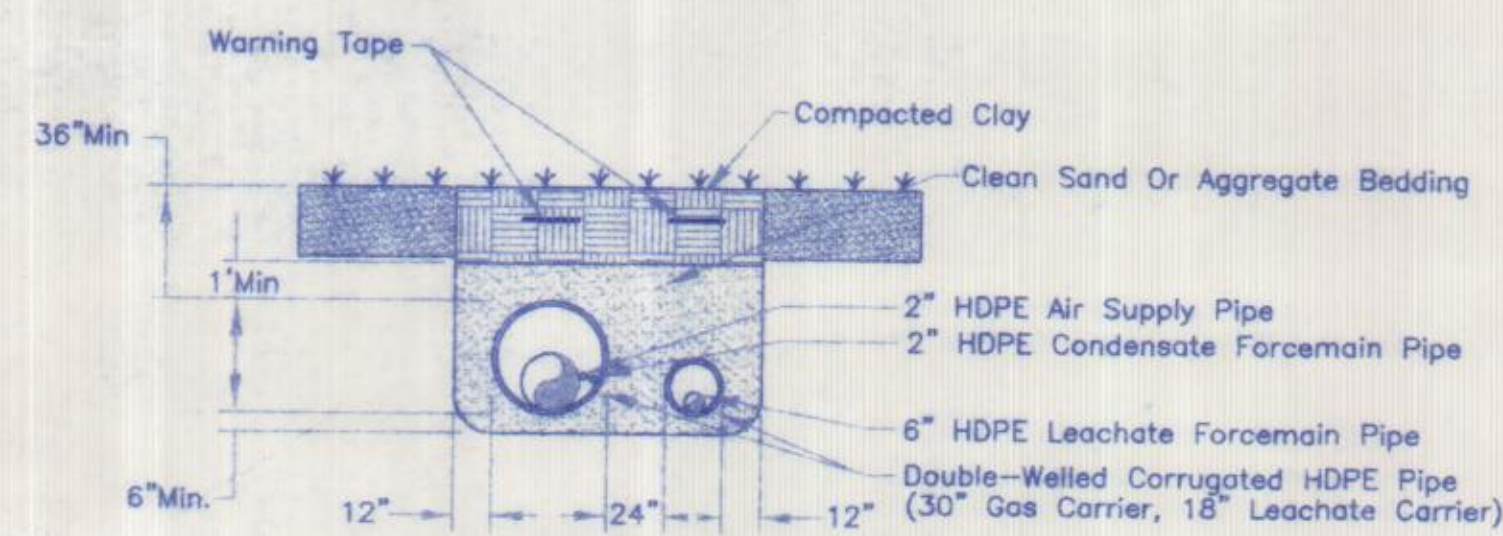
TYPICAL TEMPORARY GAS EXTRACTION WELL DETAIL
Not To Scale



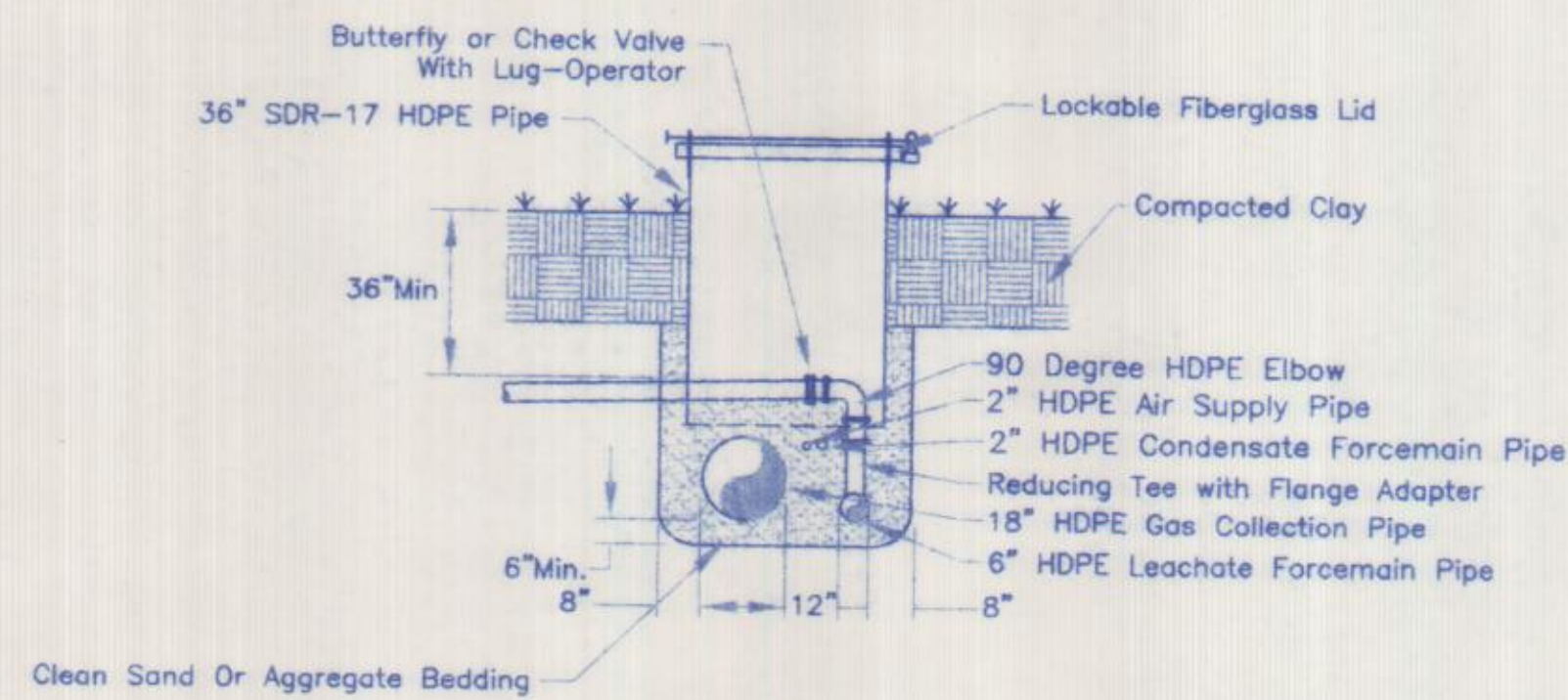
TYPICAL PERMANENT GAS EXTRACTION WELL DETAIL
Not To Scale



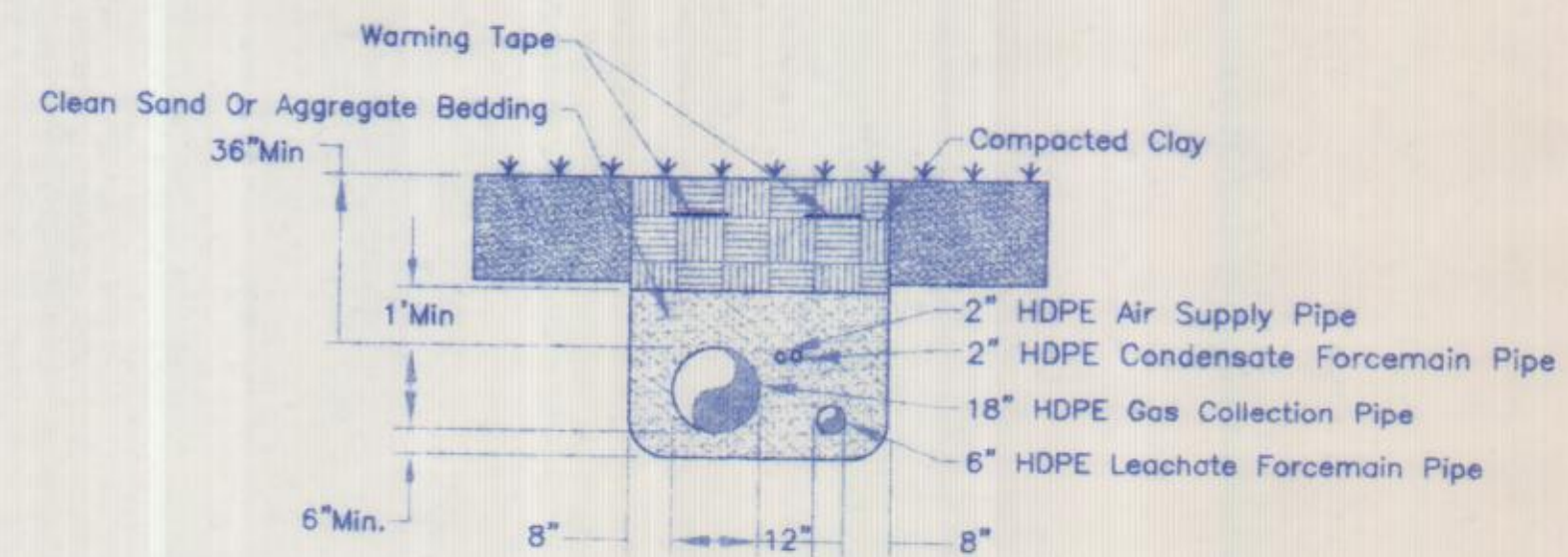
JUNCTION DETAIL
Not To Scale



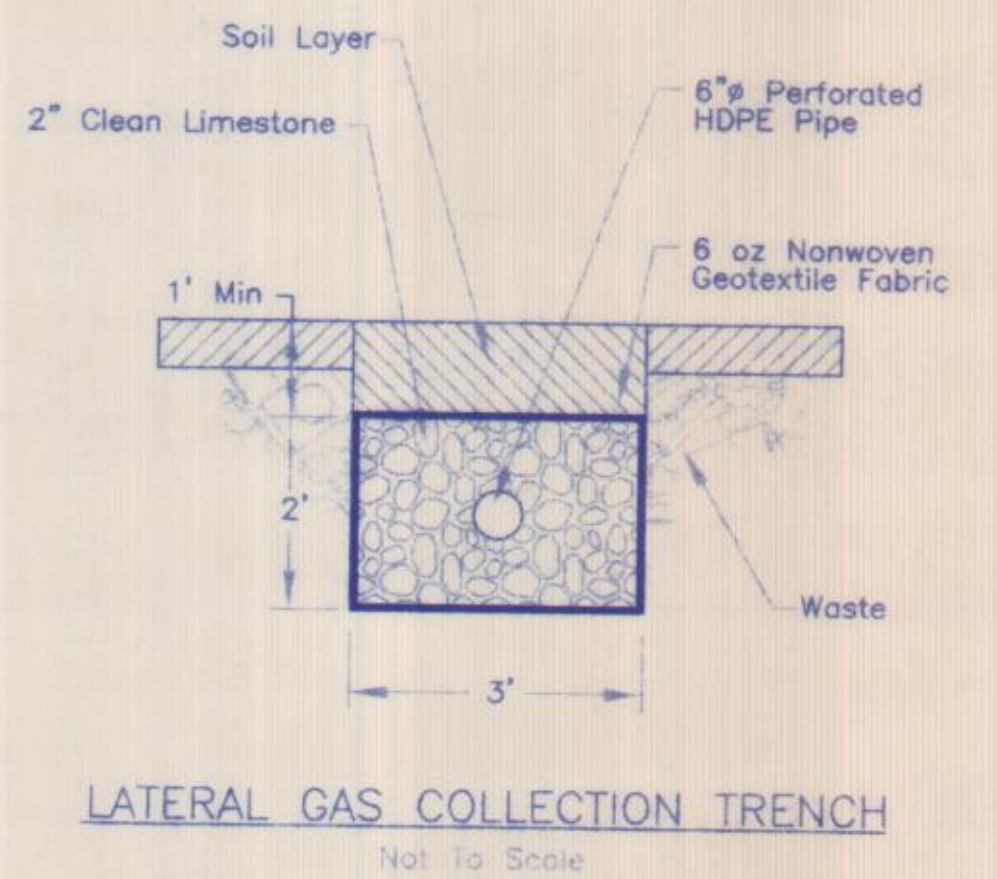
TYPICAL GAS COLLECTION & LEACHATE FORCEMAIN ROAD CROSSING TRENCH DETAIL
Not To Scale



LEACHATE COLLECTION LINE TO LEACHATE FORCEMAIN PIPE TEE DETAIL
Not To Scale



TYPICAL GAS COLLECTION & LEACHATE FORCEMAIN PIPE TRENCH DETAIL
Not To Scale



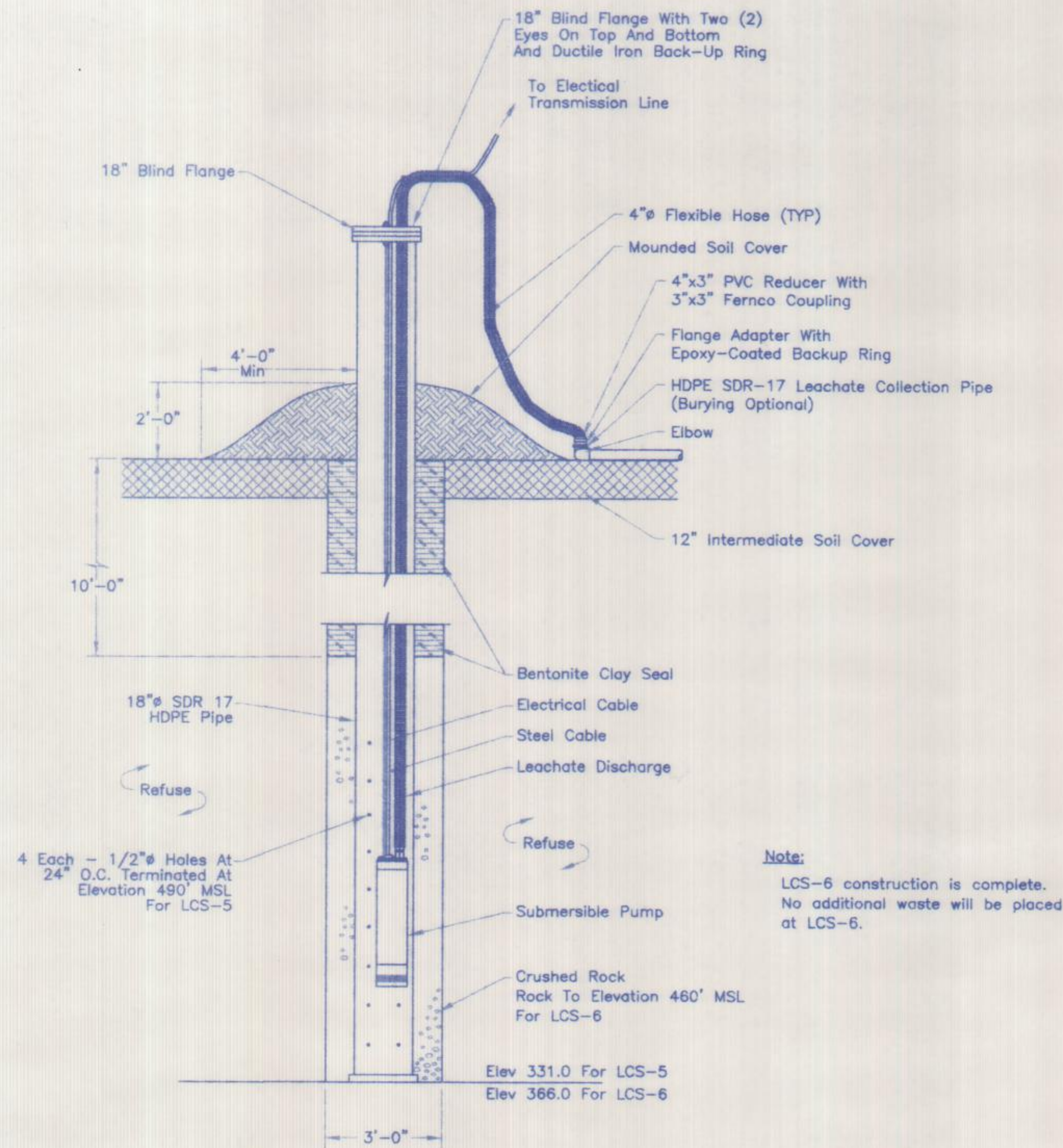
LATERAL GAS COLLECTION TRENCH
Not To Scale

| | |
|-----------|----|
| Date | By |
| | |
| Revisions | |



| | |
|-------|-------------|
| Date | 4/95 |
| Scale | As Noted |
| Drawn | CSJ |
| Job | 960145-003 |
| File | BES-Details |

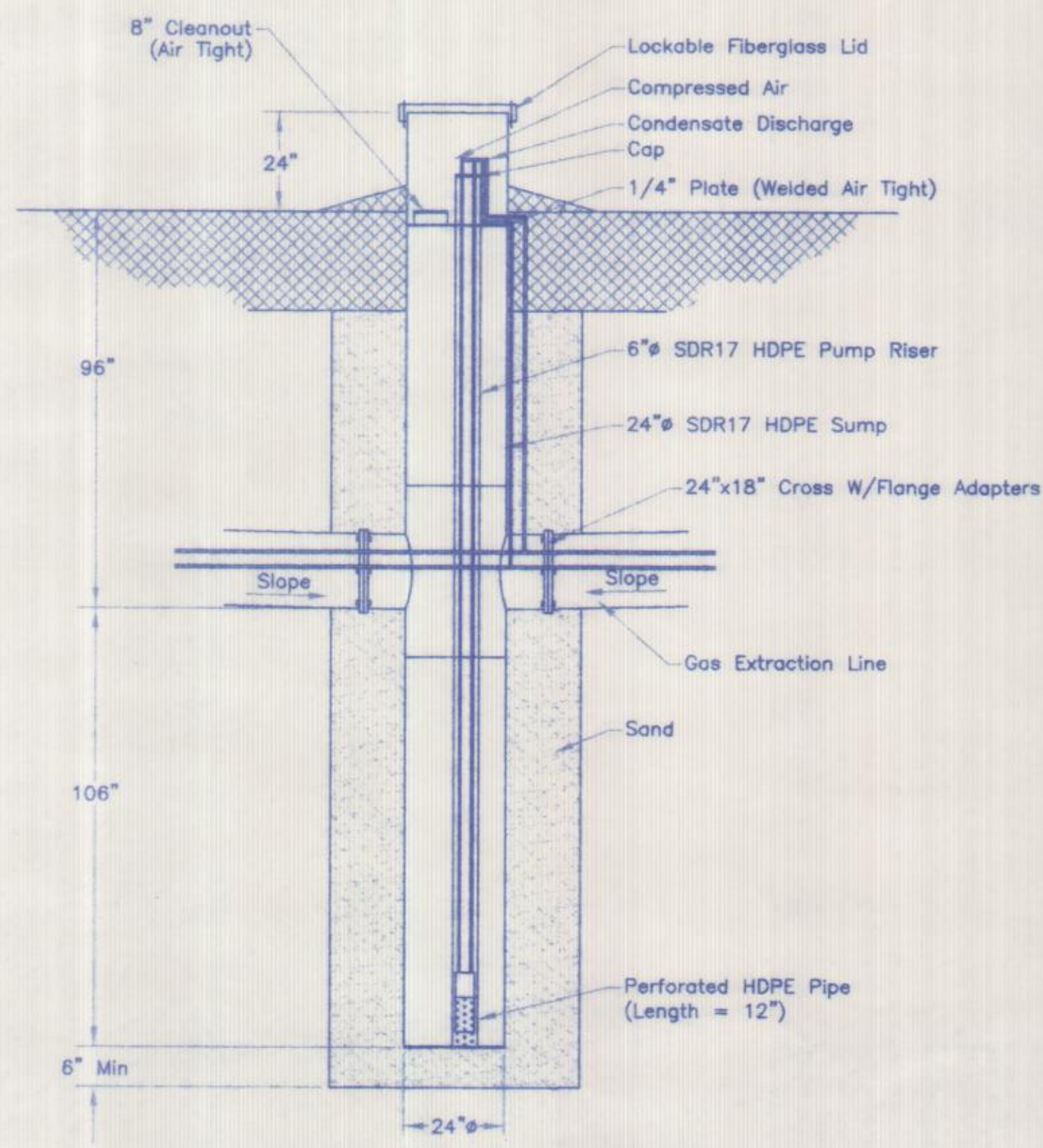
Bridgeton Landfill, LLC
Landfill Gas Recovery System & Leachate Forcemain
Details



Note:
LCS-6 construction is complete. No additional waste will be placed at LCS-6.

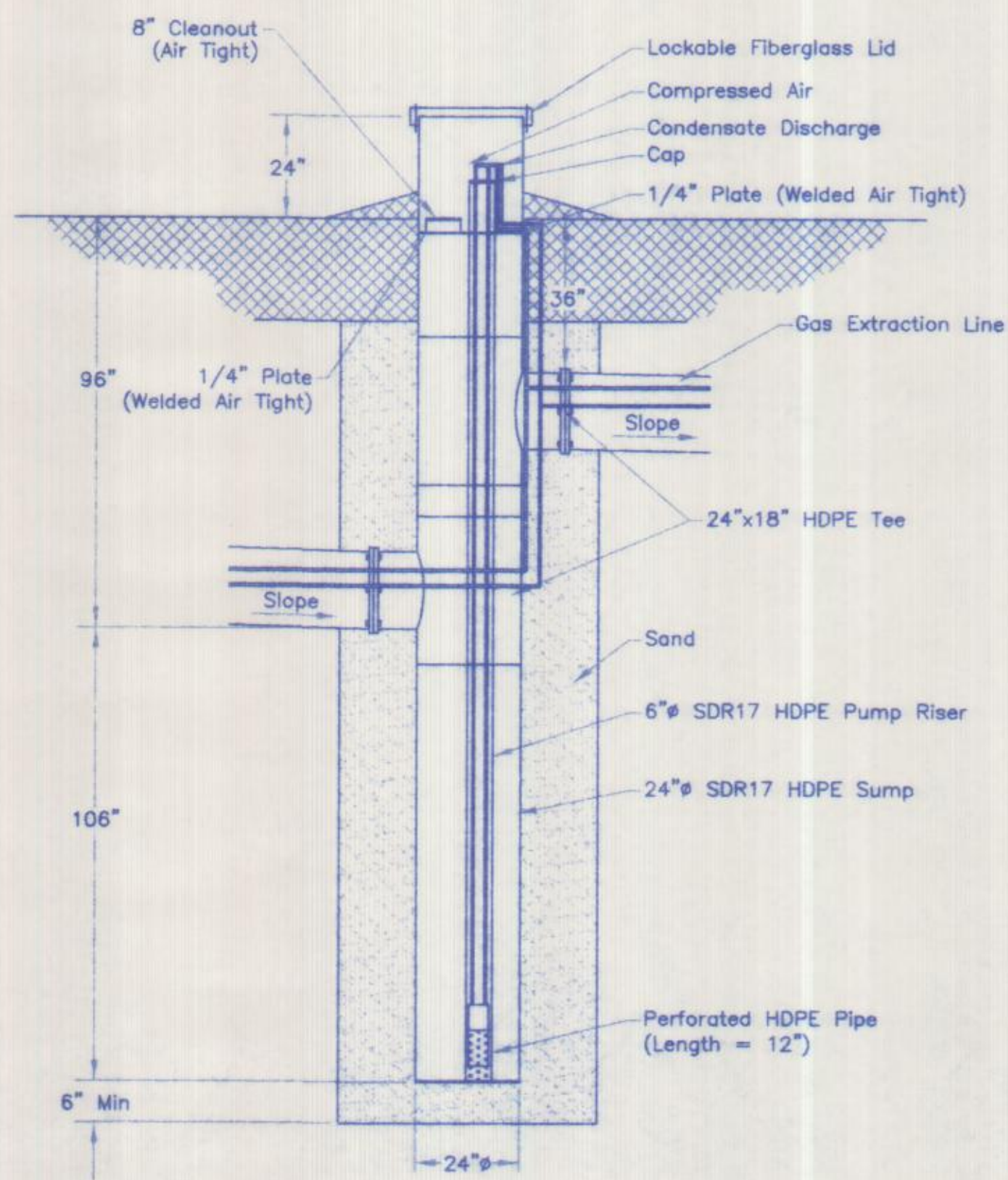
LEACHATE COLLECTION SUMPS
LCS-5 AND LCS-6

Not To Scale



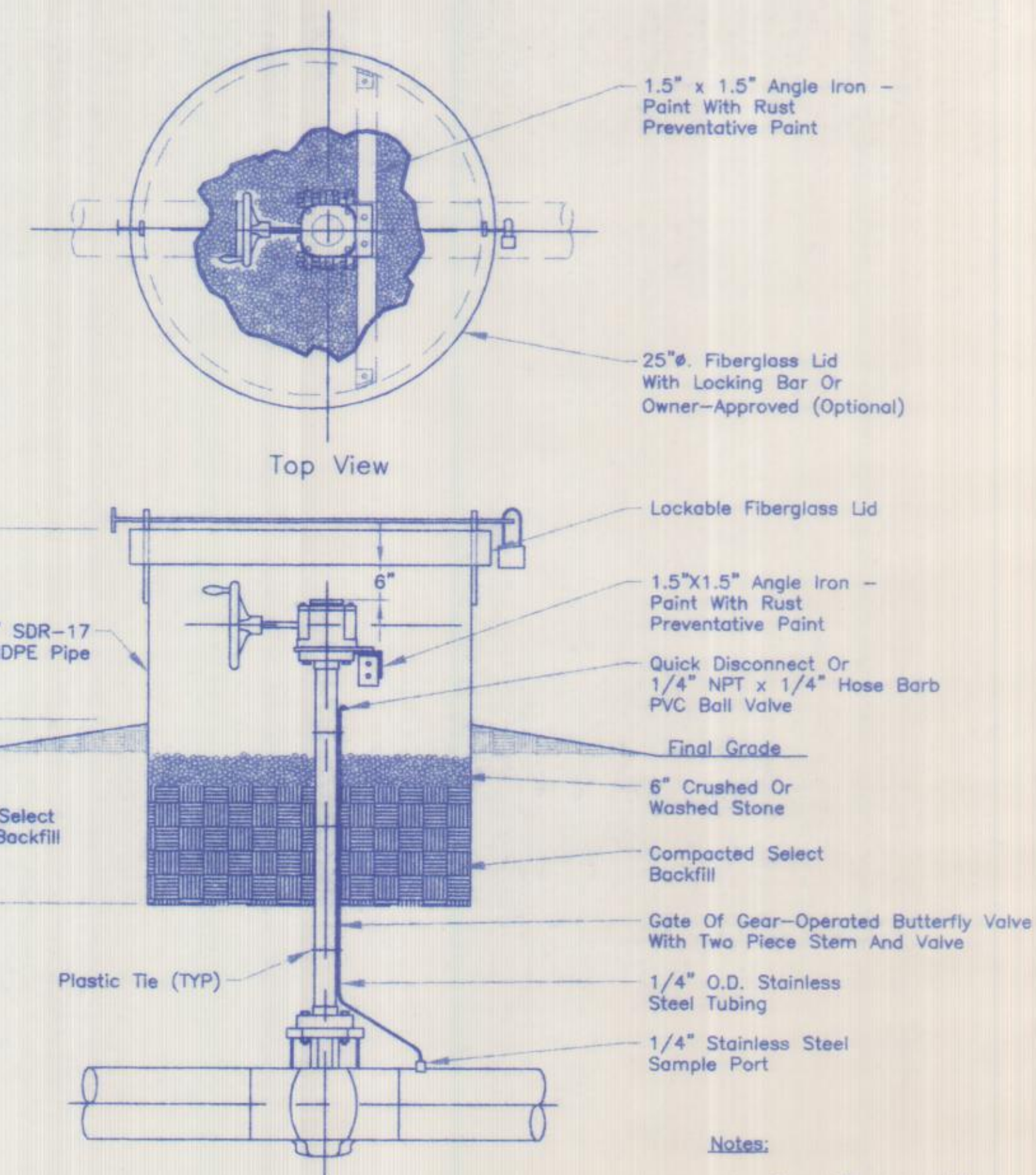
V-STYLE CONDENSATE PUMP

Not To Scale



SAW-TOOTH CONDENSATE PUMP

Not To Scale

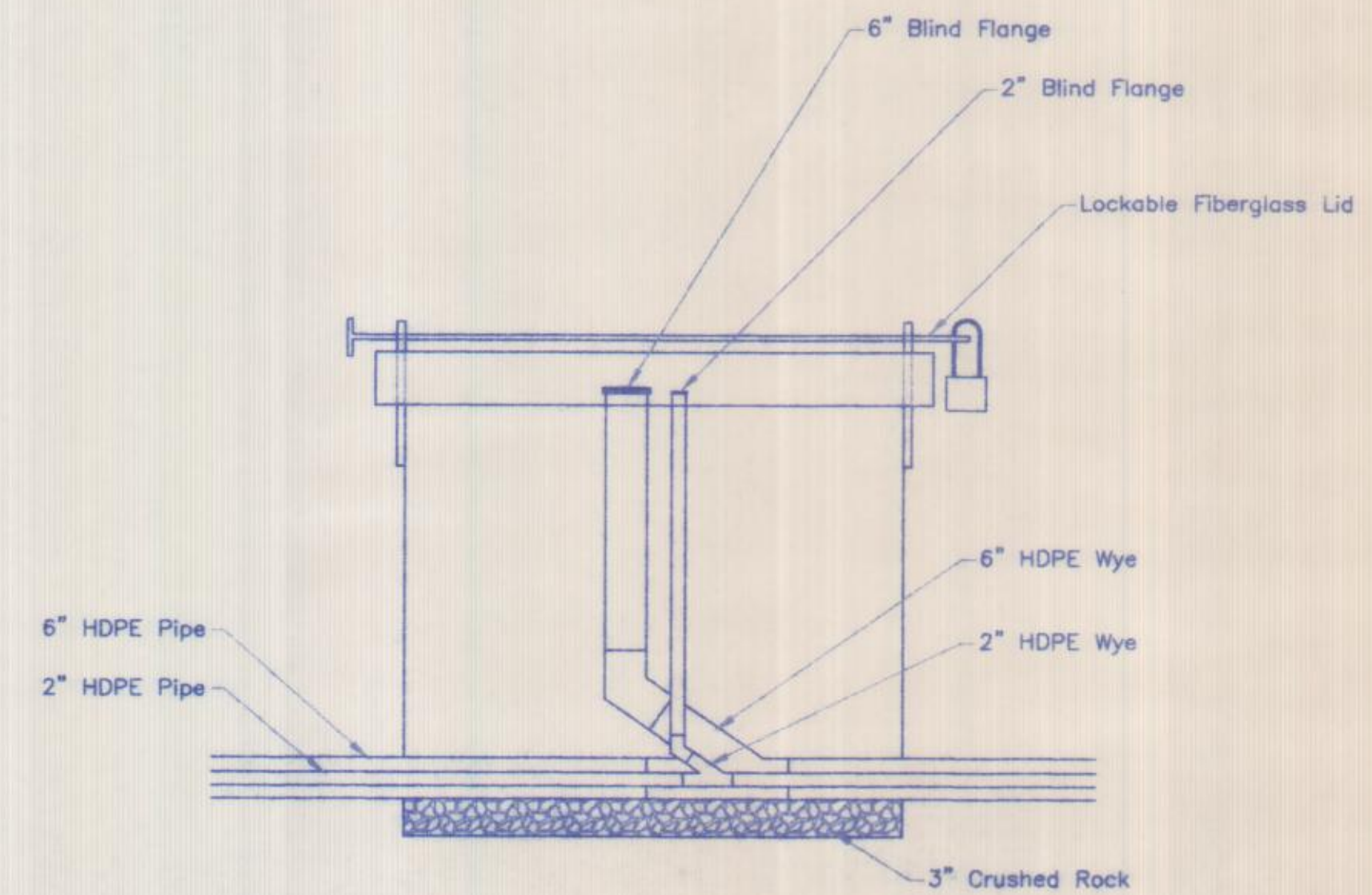


Notes:

- Place 6" of 1 1/2" washed gravel in valve enclosure near the surface.
- Grade around top of valve box for water drainage.
- Valve to be oriented so that the valve position indicator faces upward.

TYPICAL ISOLATION VALVE DETAIL

Not To Scale



LEACHATE CONDENSATE FORECAINS
CLEAN-OUT DETAIL

Not To Scale

| | |
|-----------|----|
| Date | By |
| | |
| Revisions | |



| | |
|-------|------------|
| Date | 4/98 |
| Scale | As Noted |
| Drawn | GSJ |
| Job | 960145-003 |
| File | BES Force |

Bridgeton Landfill, LLC
Landfill Gas Recovery System & Leachate Forecain
Details

Attachment 13

**1991 Leachate Sump Measurements and Analytical Data report prepared by
Environmental Analysis, Inc.**

Environmental Analysis, Inc.

3278 N. Lindbergh Blvd. • Florissant, MO 63033 • 314-921-4488



November 12, 1991

*Bridge
15.4*

Mr. Joseph Trunko
Missouri Dept. of Natural Resources
10805 Sunset Office Drive
Suite 100
St. Louis, MO 63127-107

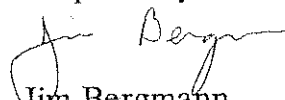
Dear Mr. Trunko,

Enclosed are the environmental monitoring reports listed below.

1. Laidlaw - Bridgeton Landfill, Bridgeton, MO
 - * Treated Leachate Laboratory Report (October, 1991)
 - * Leachate Sump Liquid Level Report to St. Louis County Public Health (October, 1991)

If you have any questions concerning any of the information enclosed, please call me at (314) 921-4488.

Respectfully submitted,


Jim Bergmann
Project Manager

cc: Randy Anderson



Environmental Analysis, Inc.

3278 N. Lindbergh Blvd. · Florissant, MO 63033 · 314-921-4488



November 12, 1991

Mr. Brad Bomanz
Waste Management Section
St. Louis County Dept. of Public Health
801 S. Brentwood Blvd.
Clayton, MO 63105

Dear Mr. Bomanz:

The following measurements were made on the leachate sumps at the Laidlaw-Bridgeton Landfill in October, 1991.

| <u>SUMP DESIGNATION</u> | <u>DEPTH OF LIQUID, FT</u> |
|-------------------------|----------------------------|
| K 100 | 24.41 |
| K 123 | 27.32 |
| K 124 | DRY |
| K 125 | 19.29 |
| K 128 | 19.46 |

If you have any questions concerning this information, please call me at 921-4488.

Respectfully submitted,

Jim Bergmann
Project Manager

cc: Randy Anderson (Laidlaw)
William Reed (Laidlaw)
Dennis Wike (Laidlaw)
Joseph Trunko (MoDNR)



Environmental Analysis, Inc.

3278 N. Lindbergh Blvd. • Florissant, MO 63033 • 314-921-4488




November 12, 1991

Mr. John Lodderhose
St. Louis Metropolitan Sewer District
#10 East Grand
St. Louis, MO 63147

Dear Mr. Lodderhose:

The enclosed laboratory report represents the analysis of treated leachate from the Laidlaw-Bridgeton Landfill. This report is for the sample collected in October, 1991. If you have any questions, please contact me at (314) 921-4488.

Respectfully submitted,


Jim Bergmann
Project Manager

cc: Randy Anderson (Laidlaw)
William Reed (Laidlaw)
Dennis Wike (Laidlaw)



Environmental Analysis, Inc.

3278 N. Lindbergh Blvd. · Florissant, MO 63033 · 314-921-4488



MR. RANDY ANDERSON
LAIDLAW WASTE SYSTEM
BRIDGETON LANDFILL
13570 ST. CHARLES ROCK RD
BRIDGETON MO 63044

PAGE NO : 1
REPORT NO : 45932
DATE : 11/08/91
P.O. No. : 054639

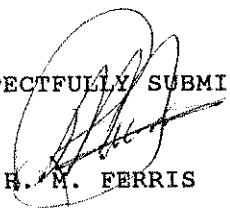
REPORT OF ANALYSIS

SUBJECT : Analysis of water and/or wastewater samples in accordance with Standard Methods for the Examination of Water and Wastewater, 17th Edition, 1989; where applicable.

| LOG NUMBER | SAMPLE DESCRIPTION |
|------------|----------------------|
| 1316513 | TRTD LEACH 10/25/91C |

RESULTS OF ANALYSIS APPEAR ON FOLLOWING PAGES

RESPECTFULLY SUBMITTED


R. M. FERRIS



Environmental Analysis, Inc.

3278 N. Lindbergh Blvd. · Florissant, MO 63033 · 314-921-4488



LIDLAW WASTE SYSTEM

PAGE NO : 2
REPORT NO : 45932
DATE : 11/08/91

RESULTS OF ANALYSIS

| LOG NUMBER | SAMPLE DESCRIPTION | TEST NAME | RESULTS OF ANALYSIS | UNITS OF EXPRESSION |
|------------|----------------------|--------------------|---------------------|---------------------|
| 1316513 | TRTD LEACH 10/25/91c | Arsenic | <0.005 | mg As/l |
| | | Barium | 0.456 | mg Ba/l |
| | | B.O.D. (5-day) | 121 | mg/l |
| | | Cadmium | <0.005 | mg Cd/l |
| | | C.O.D. | 382 | mg/l |
| | | Chromium | <0.010 | mg Cr/l |
| | | Copper | 0.005 | mg Cu/l |
| | | Iron | 2.01 | mg Fe/l |
| | | Mercury | <0.0002 | mg Hg/l |
| | | Nickel | <0.05 | mg Ni/l |
| | | Lead (GTF) | 0.006 | mg Pb/l |
| | | pH Value | 7.79 | pH Unit |
| | | Selenium | <0.005 | mg Se/l |
| | | Temperature | 17 | deg. C |
| | | Technician Charges | 6 | man-hrs |
| | | Zinc | 0.123 | mg Zn/l |



Environmental Analysis, Inc.

3278 N. Lindbergh Blvd. • Florissant, MO 63033 • 314-921-4488



METHOD NUMBERS AND DETECTION LIMITS

| <u>TEST</u> | <u>METHOD NUMBER</u> | <u>DETECTION LIMITS</u> |
|-------------|----------------------|-------------------------|
| Arsenic | SM17-3113B | 0.005 mg/l |
| Barium | SM17-3120B | 0.005 mg/l |
| B.O.D. | SM17-5210B | 2.0 mg/l |
| Cadmium | SM17-3120B | 0.005 mg/l |
| C.O.D. | SM17-5220D | 2.0 mg/l |
| Chromium | SM17-3120B | 0.010 mg/l |
| Copper | SM17-3120B | 0.005 mg/l |
| Iron | SM17-3120B | 0.05 mg/l |
| Mercury | SM17-3112B | 0.0002 mg/l |
| Nickel | SM17-3120B | 0.05 mg/l |
| Lead (GTF) | SM17-3113B | 0.005 mg/l |
| pH | SM17-4500-H+-B | 0.01 ph Unit |
| Selenium | SM17-3113B | 0.005 mg/l |
| Zinc | SM17-3120B | 0.005 mg/l |

SM17:

Analysis of water and/or wastewater samples in accordance with Standard Methods for the Examination of Water and Wastewater, 17th Edition, 1989; where applicable.



Environmental Analysis, Inc.

3278 N. Lindbergh Blvd. • Florissant, MO 63033 • 314-921-4488



SAMPLE CHAIN-OF-CUSTODY RECORD

| | | | | | | | |
|---------------------------------|---|--|--|------------------------------------|--|--------------------------|--|
| Client Name | Laidlaw Waste Systems | Bottle | | Preservative | | Tests Requested | |
| Address | Bridgeton Landfill 13570 St. Charles Rock Rd. Bridgeton, MO 63044 | 1/2 Pt. Plast. Pt. Plast. Qt. Plast. | | H2SO4, Cool HNO3 Cool to 4 C | | COD Metals pH, BOD | |
| Contact | Mr. Randy Anderson | | | | | | |
| Telephone | 314 739-1919 | | | | | | |
| Sample Identification | TRTD LEACH | | | | | | |
| Date/Time Collected | 10-25-91 / 8:45 | | | | | | |
| Sample Type | Treated Leachate | | | | | | |
| Collected By (Signature) | <i>[Signature]</i> | 3 | | Total Bottles | | | |

LABORATORY RECORD

Lab #1 - Environmental Analysis, Inc. Laboratory Log Number 1316513

Sample Received By (signature) *[Signature]* Date/Time 10-25-91 / 10:00

| Analyses Performed | Analyzed By (signature) | Date/Time Analyzed | Analyses Performed | Analyzed By (signature) | Date/Time Analyzed |
|----------------------------|-------------------------|--------------------|--------------------|-------------------------|--------------------|
| As | <i>[Signature]</i> | 10-28-91 | | | |
| Pb | <i>[Signature]</i> | 10-25-91 | | | |
| Cr, Zn, Cd, Ni, Cu, Fe, Mn | <i>[Signature]</i> | 10-30-91 13:07 | | | |
| PB | <i>[Signature]</i> | 11-4-91 0953 | | | |
| Hg | <i>[Signature]</i> | 11-5-91 1108 | | | |
| AS | <i>[Signature]</i> | 11-6-91 0847 | | | |
| SE | <i>[Signature]</i> | 11-5-91 1346 | | | |
| COD | <i>[Signature]</i> | 10-27-91 | | | |

REPORT OF ANALYSIS

Lab #1: Report No. 45932 Date: 11/8/91 Signature: *[Signature]*
 Title: _____



Environmental Analysis, Inc.

3278 N. Lindbergh Blvd. · Florissant, MO 63033 · 314-921-4488



INVOICE NO : 45932

DATE : 11/08/91

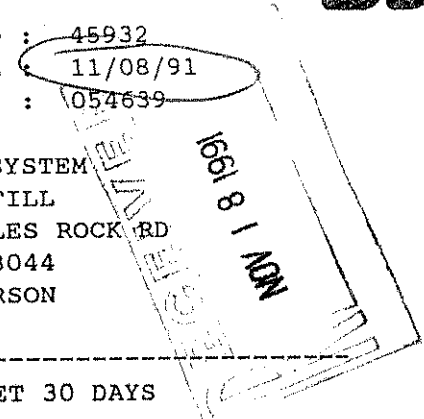
CUSTOMER P.O. : 1054639

BILL TO:

LIDLAW WASTE SYSTEM
BRIDGETON LANDFILL
13570 ST. CHARLES ROCK RD
BRIDGETON MO 63044
MR. RANDY ANDERSON

REPORT TO:

LIDLAW WASTE SYSTEM
BRIDGETON LANDFILL
13570 ST. CHARLES ROCK RD
BRIDGETON MO 63044
MR. RANDY ANDERSON



Date Sent 11/08/91

Sent VIA U. S. MAIL

Terms : NET 30 DAYS

| Quantity | Description | Unit Price | Amount |
|----------|--------------------|------------|--------|
| 1 | Arsenic | 15.05 | 15.05 |
| 1 | Barium | 15.05 | 15.05 |
| 1 | B.O.D. (5-day) | 21.78 | 21.78 |
| 1 | Cadmium | 15.05 | 15.05 |
| 1 | C.O.D. | 9.90 | 9.90 |
| 1 | Chromium | 7.13 | 7.13 |
| 1 | Copper | 7.13 | 7.13 |
| 1 | Iron | 7.13 | 7.13 |
| 1 | Mercury | 15.05 | 15.05 |
| 1 | Nickel | 7.13 | 7.13 |
| 1 | Lead (GTF) | 15.05 | 15.05 |
| 1 | pH Value | 3.96 | 3.96 |
| 1 | Selenium | 15.05 | 15.05 |
| 1 | Temperature | 3.96 | 3.96 |
| 6 | Technician Charges | 33.00 | 198.00 |
| 1 | Zinc | 7.13 | 7.13 |

Thank You

TOTAL==>> 363.55



Attachment 14

1992 drawing entitled "*Gas Collection System Plan*" prepared by Laidlaw Technologies, Inc.

GAS COLLECTION SYSTEM BRIDGETON SANITARY LANDFILL

PREPARED FOR:
LAIDLAW WASTE SYSTEMS, INC.
BRIDGETON MISSOURI

BY
LAIDLAW GAS RECOVERY SYSTEMS
NEWARK, CALIFORNIA

Foth & Van Dyke

2737 S. Ridge Road
P. O. Box 19012
Green Bay, WI 54907-9012

INDEX TO DRAWINGS

1. COVER SHEET/INDEX
2. GAS COLLECTION SYSTEM PLAN
3. GAS COLLECTION SYSTEM DETAILS-SHEET1
4. GAS COLLECTION SYSTEM DETAILS-SHEET2
5. PROCESS & INSTRUMENTATION DIAGRAM
6. GAS FLARING STATION PLAN
7. GAS FLARING STATION ELEVATION
8. GAS COLLECTION SYSTEM SPECIFICATIONS

Handwritten signature: Nandakumar Perumal
3-20-92

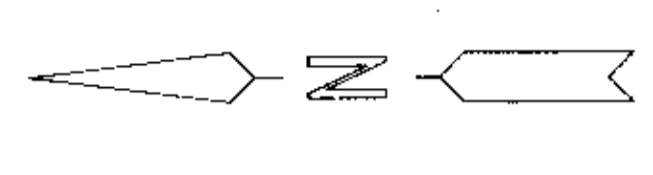
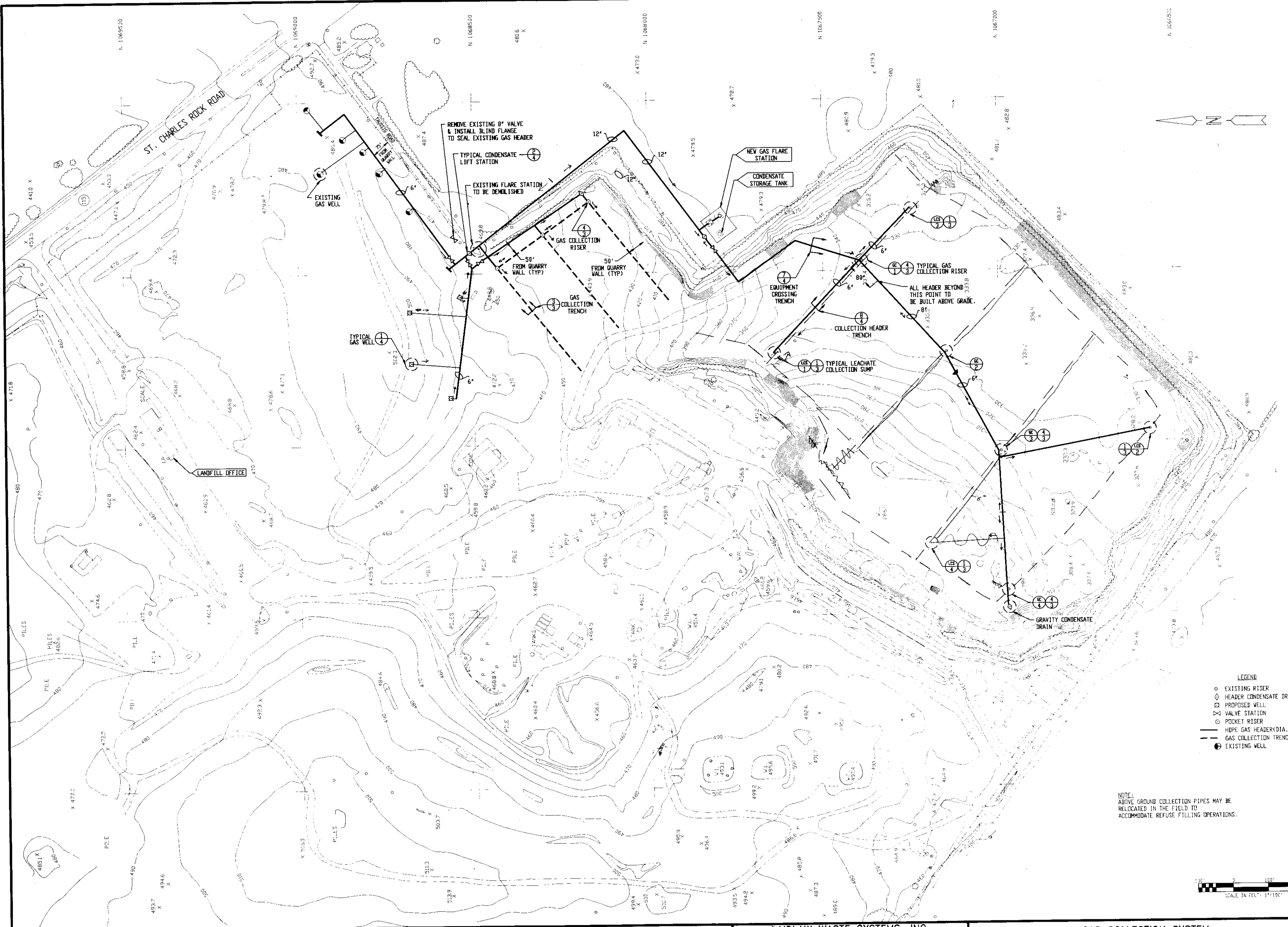
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LAIDLAW



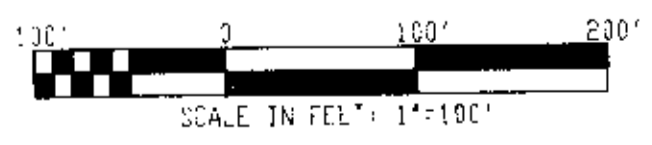
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Sheet No. 1
of 8 Sheets
Job No. BGTNCOV



- LEGEND**
- EXISTING RISER
 - ⊠ HEADER CONDENSATE DRAIN
 - ⊞ PROPOSED WELL
 - ⊞ VALVE STATION
 - ⊞ POCKET RISER
 - HDPE GAS HEADER (DIA. VARIES)
 - - - GAS COLLECTION TRENCH
 - EXISTING WELL

NOTE:
 ABOVE GROUND COLLECTION PIPES MAY BE
 RELOCATED IN THE FIELD TO
 ACCOMMODATE REFUSE FILLING OPERATIONS.



| | | | | |
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| Revision | Date | By | Description | APPRO'D |

Scale: 1"=100'
 Surveyed: _____
 Designed: MN
 Drawn: RER
 Checked: _____

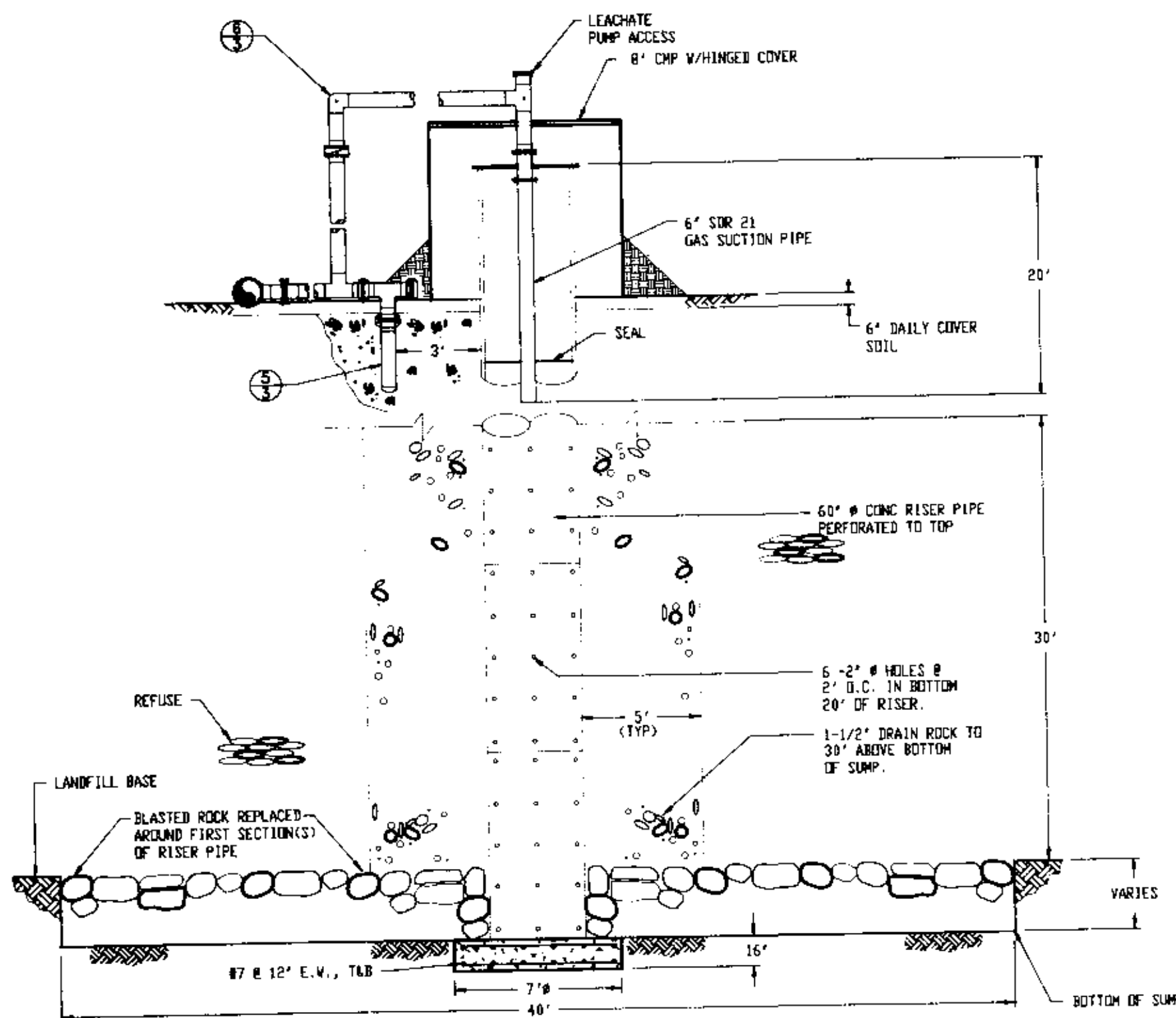


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LIDLAW WASTE SYSTEMS, INC.
BRIDGETON SANITARY LANDFILL
GAS COLLECTION SYSTEM
 BRIDGETON MISSOURI

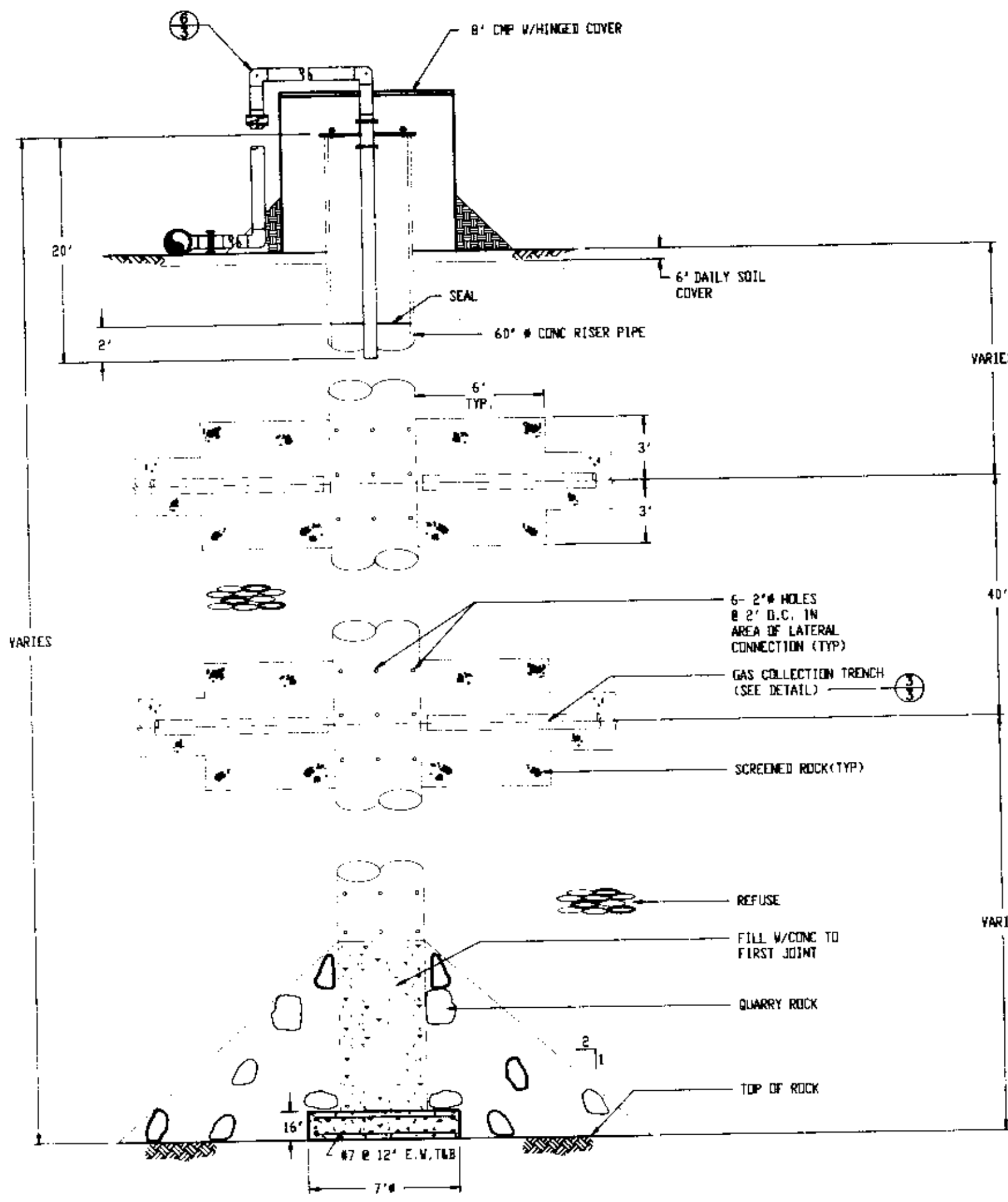
GAS COLLECTION SYSTEM
PLAN

Sheet No. **2**
 of 8
 Job No. BGTN

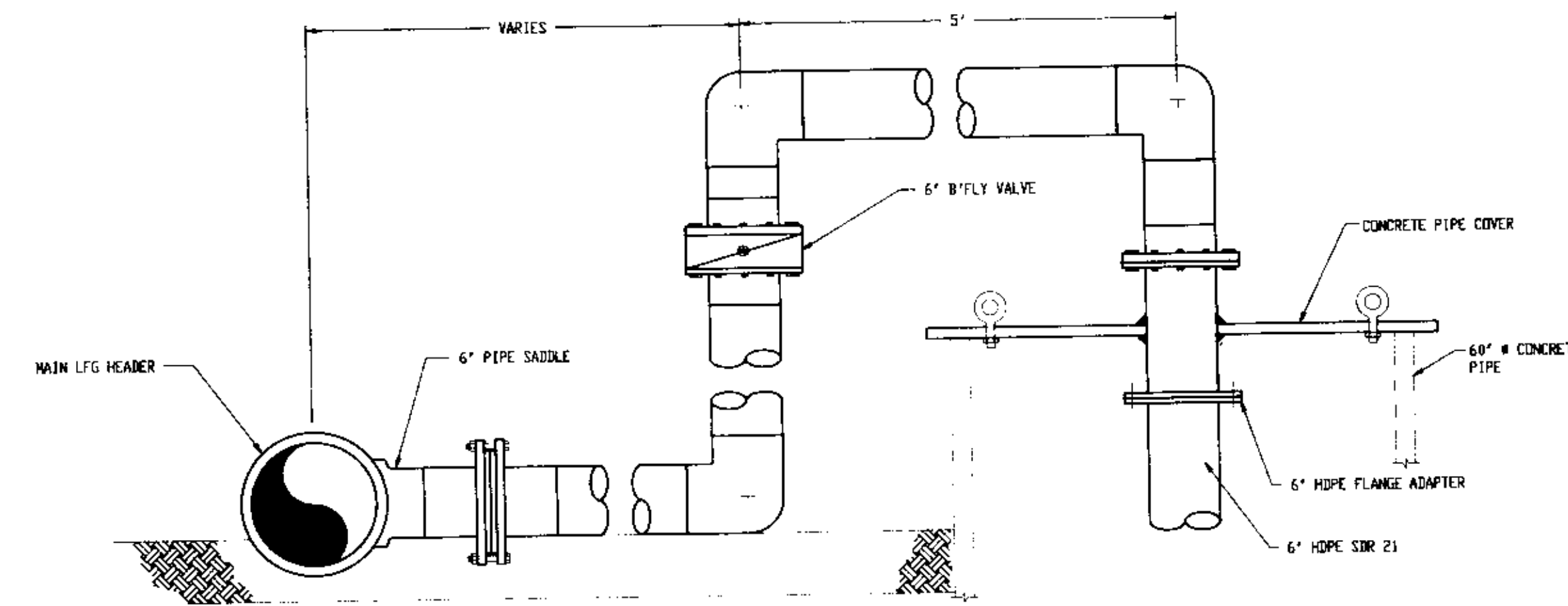


1 TYPICAL LEACHATE COLLECTION SUMP

NOTE:
ABOVE GROUND HEADER PIPE
CONNECTIONS MAY BE MODIFIED
TO ACCOMMODATE FILLING
OPERATIONS.

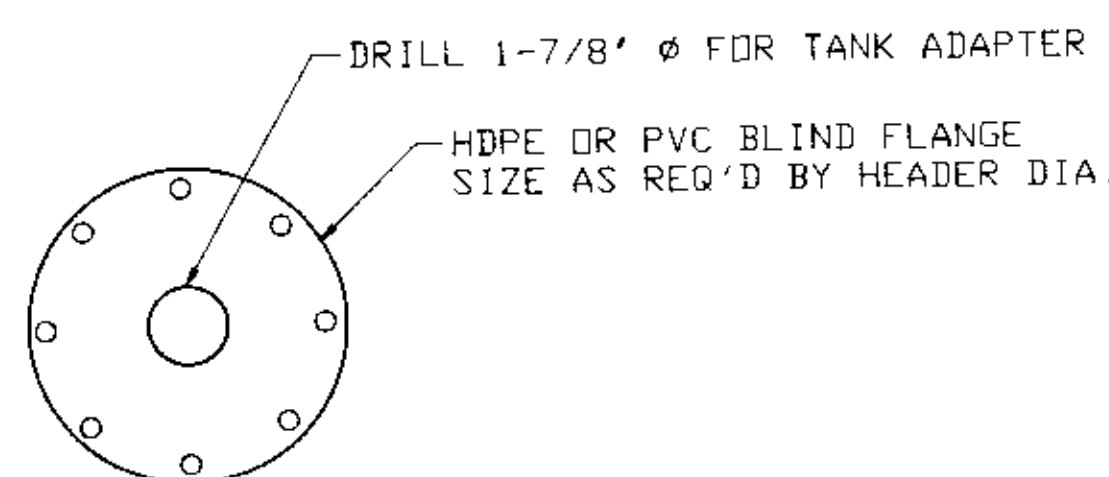


4 TYPICAL GAS COLLECTION RISER

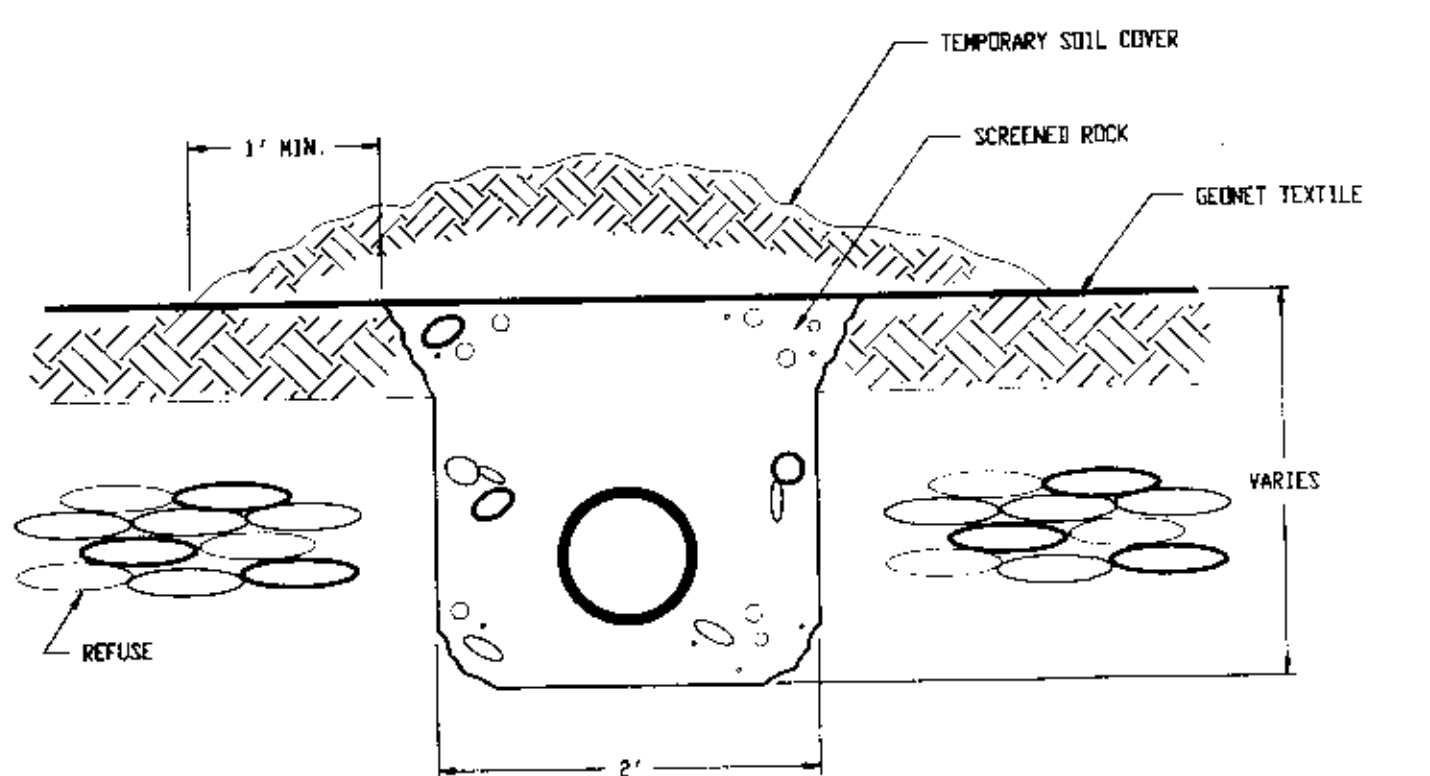


6 CONNECTION OF GAS HEADER TO PIPE RISER

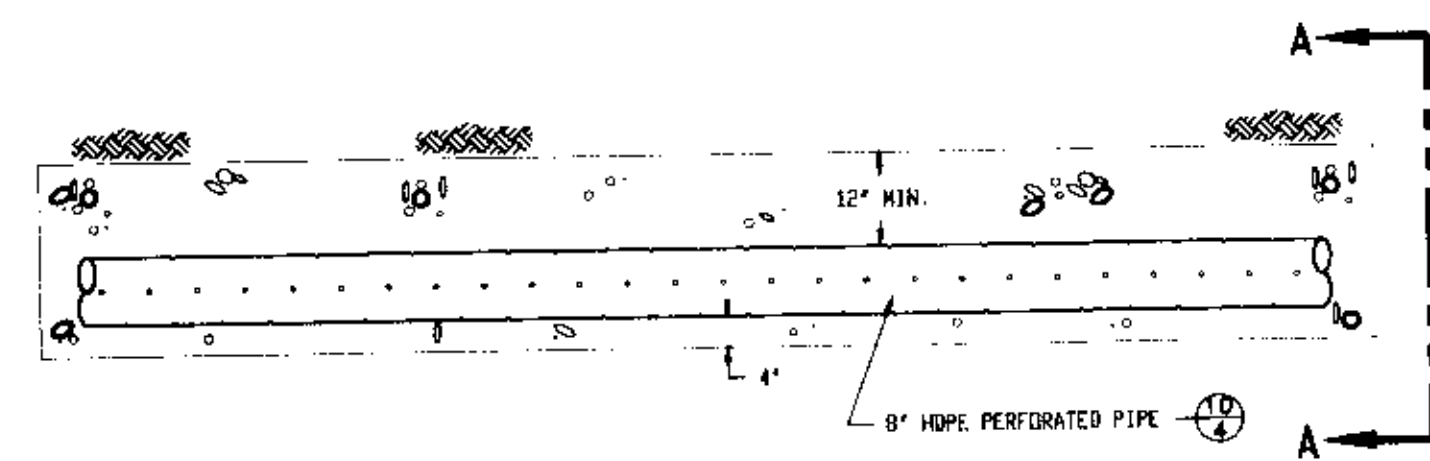
NOTES:
A- COAT ALL BOLTS W/WATER PROOF GREASE.
WRAP ALL FLANGES W/3 LAYERS OF 10 MIL
POLYETHYLENE SHEET.
SEAL SHEET W/3 MIL ELECTRICAL CONDUIT TAPE.
B- FILL TRAP WITH 5 GALLONS OF
WATER PRIOR TO BACKFILLING.
C- ALL STEEL TO BE COATED WITH
ACID RESISTANT EPOXY PAINT.



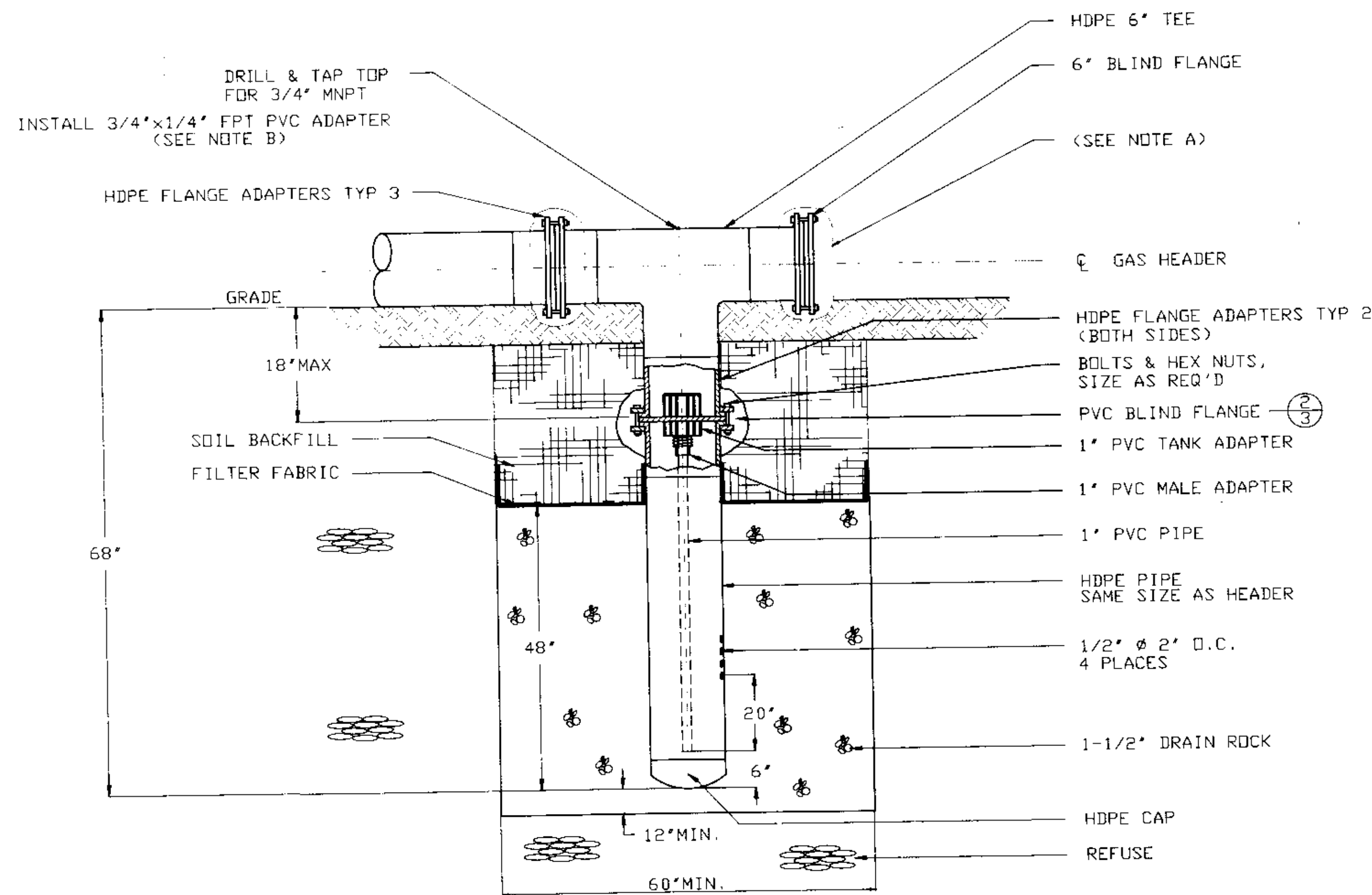
2 BLIND FLANGE



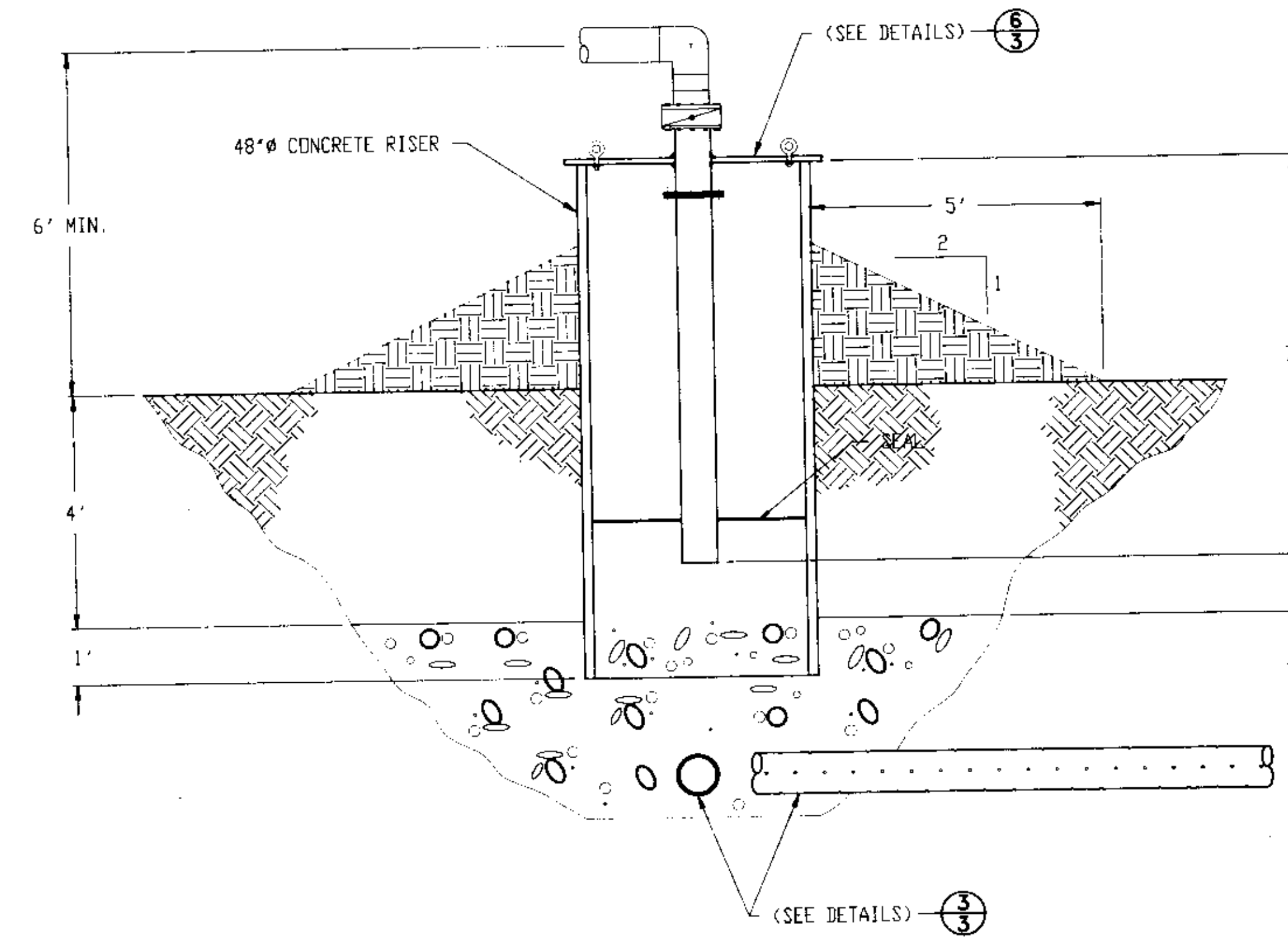
SECTION A-A



3 TYPICAL GAS COLLECTION TRENCH



5 HEADER DRAIN



7 POCKET AREA GAS COLLECTION RISER

| | | | | | |
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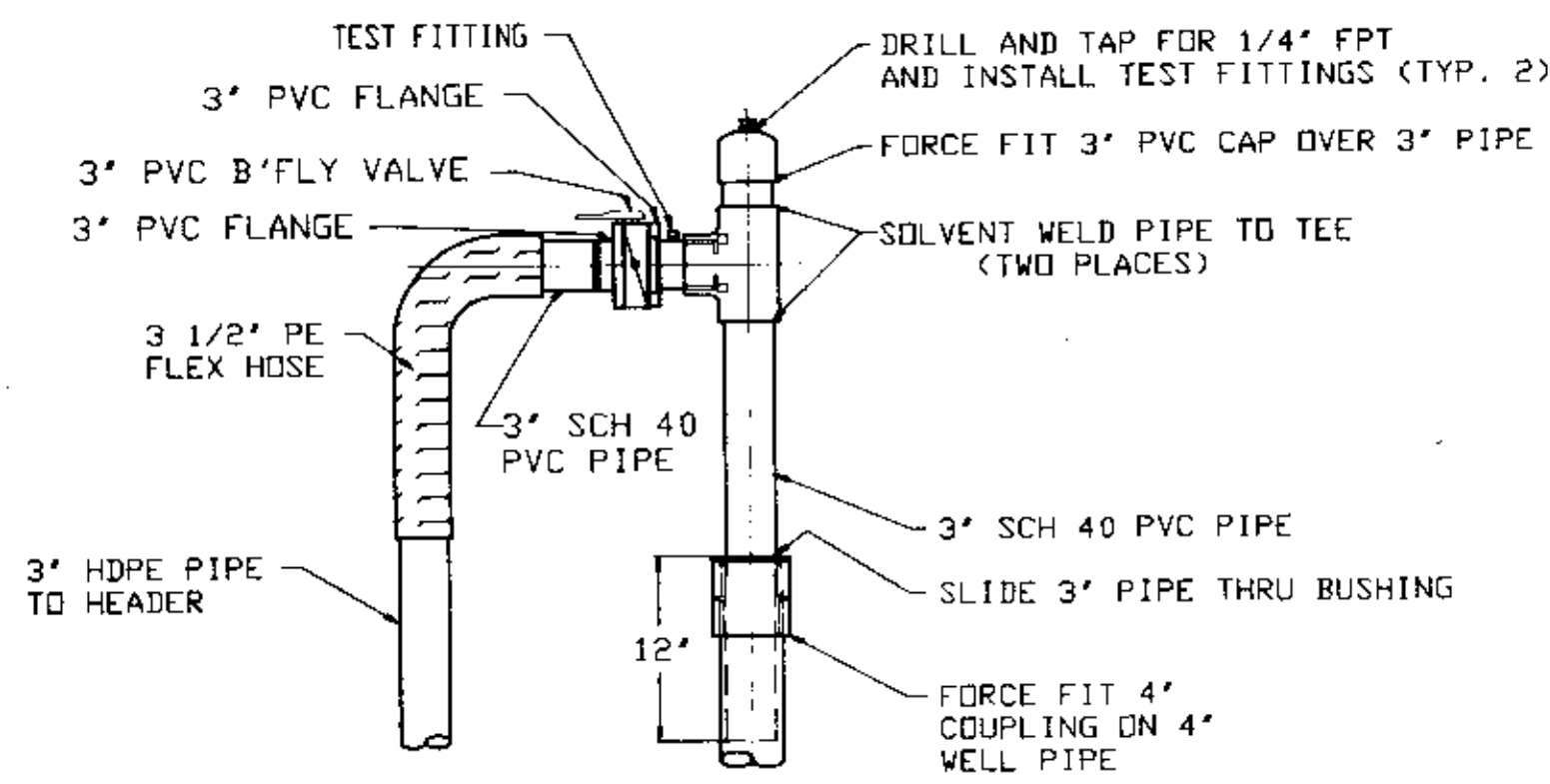


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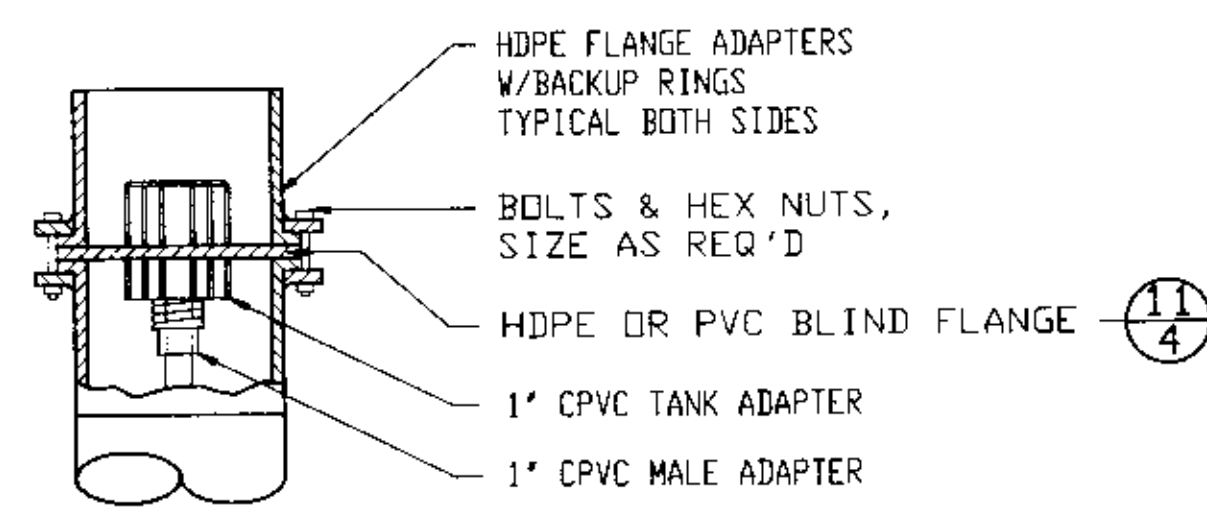
LIDLAW WASTE SYSTEMS, INC.
BRIDGETON SANITARY LANDFILL
GAS COLLECTION SYSTEM
BRIDGETON MISSOURI

GAS COLLECTION SYSTEM DETAILS
SHEET 1

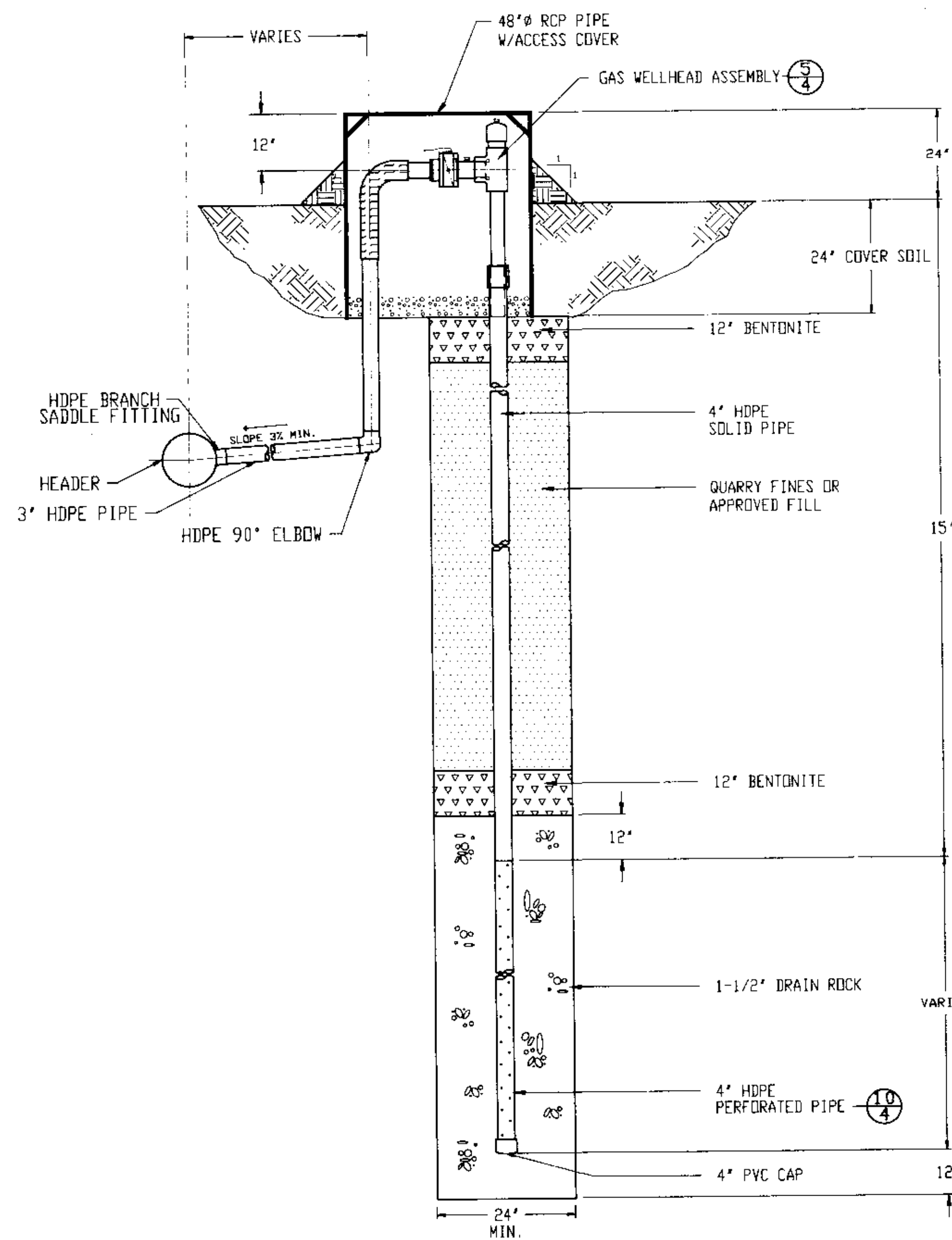
Sheet No. 3
of 8
Job No. BGT



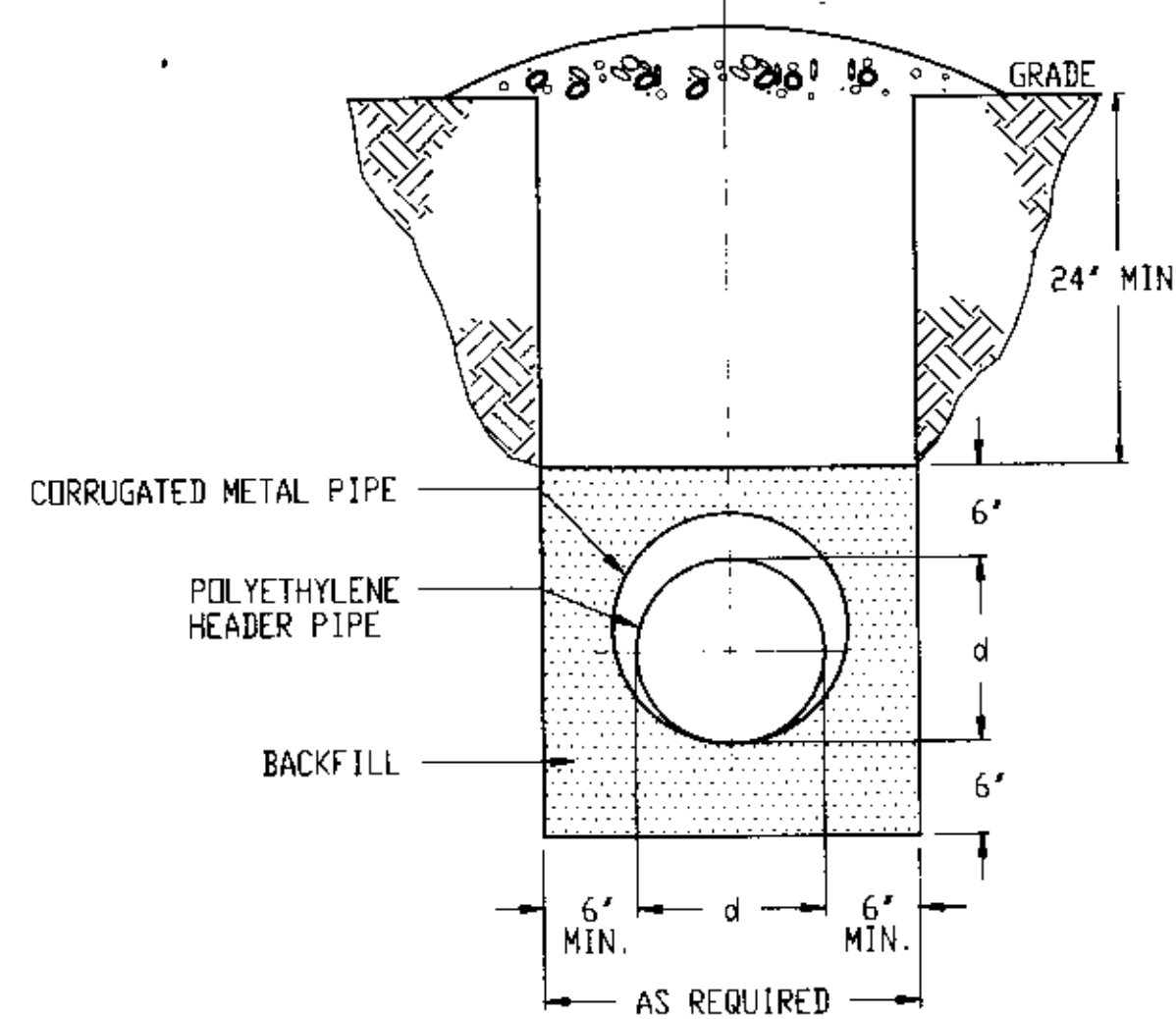
5 WELLHEAD ASSEMBLY
4



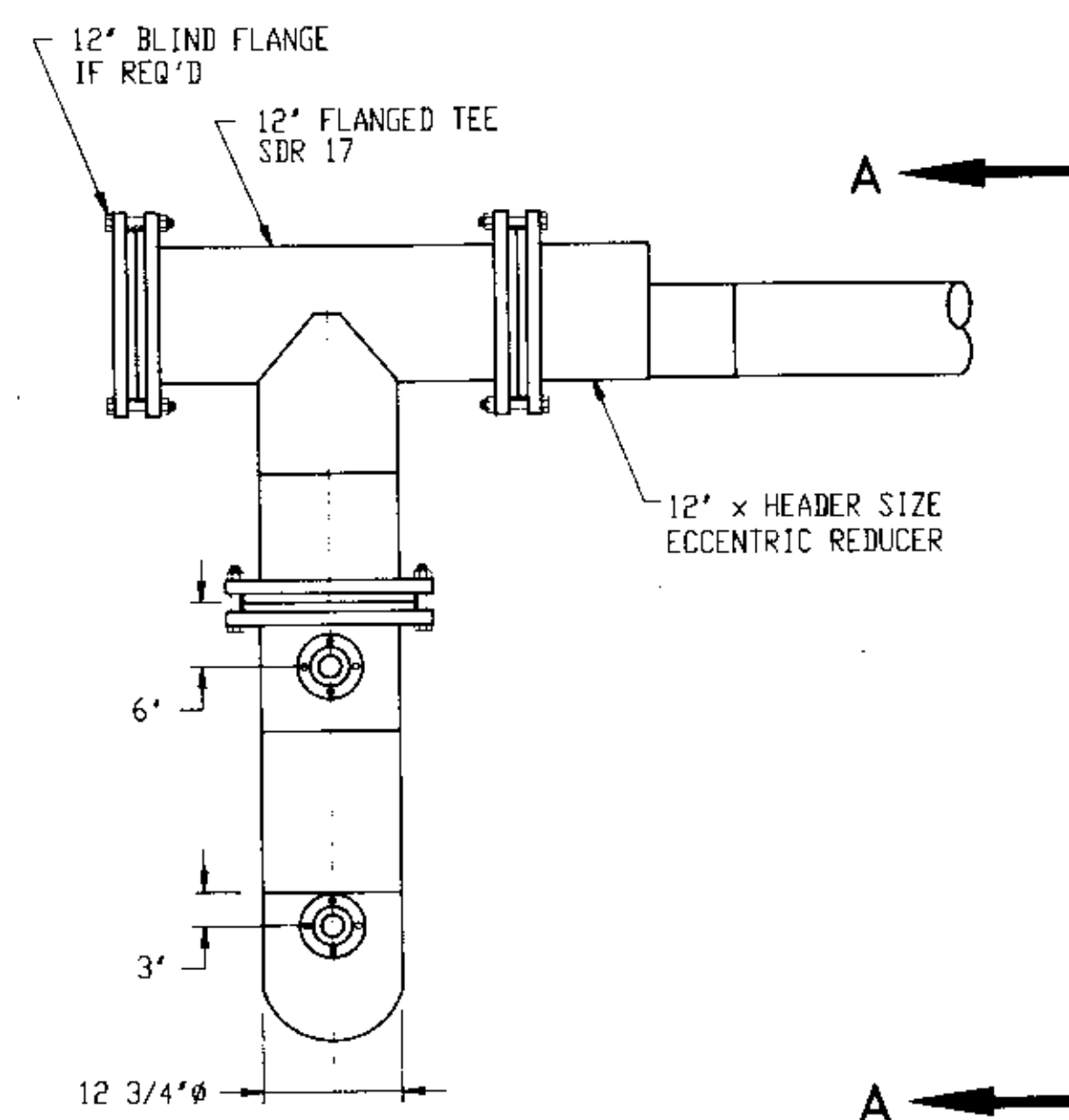
6 DRAIN TUBE CONNECTION DETAIL
4



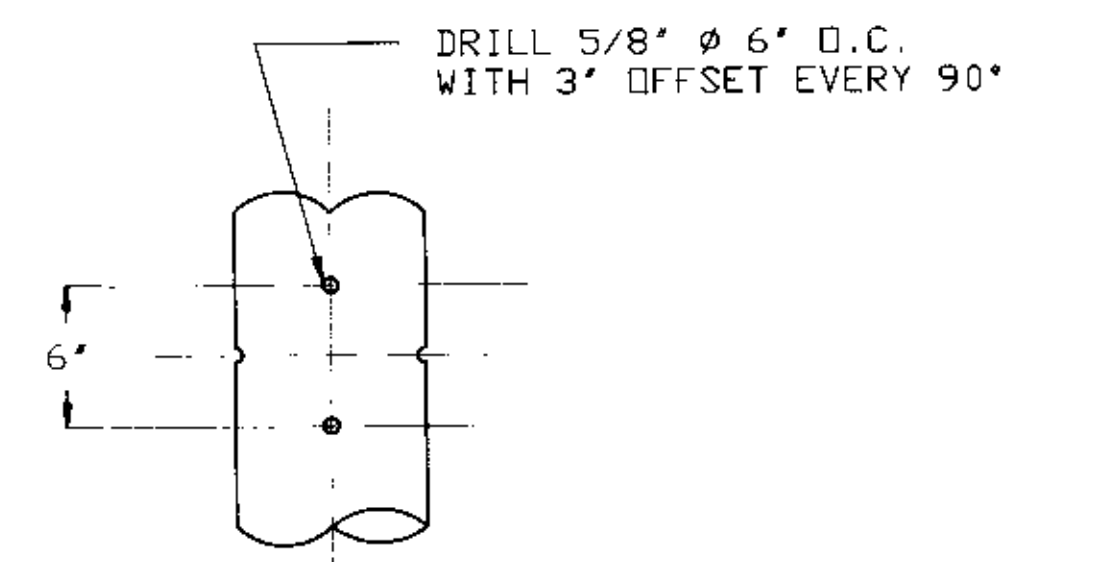
1 TYPICAL GAS WELL
4



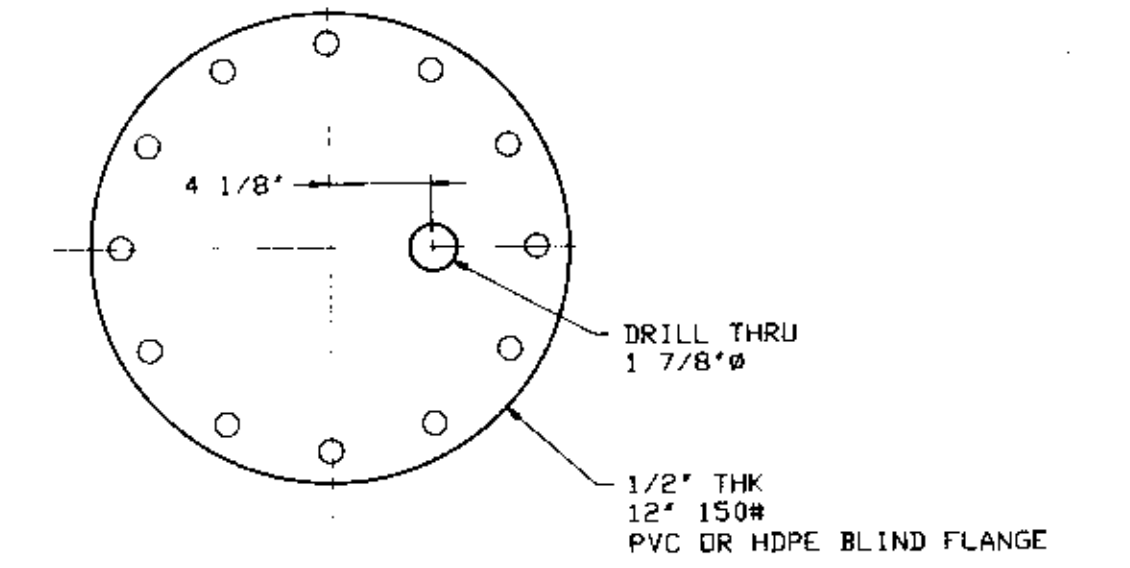
7 EQUIPMENT CROSSING TRENCH
4



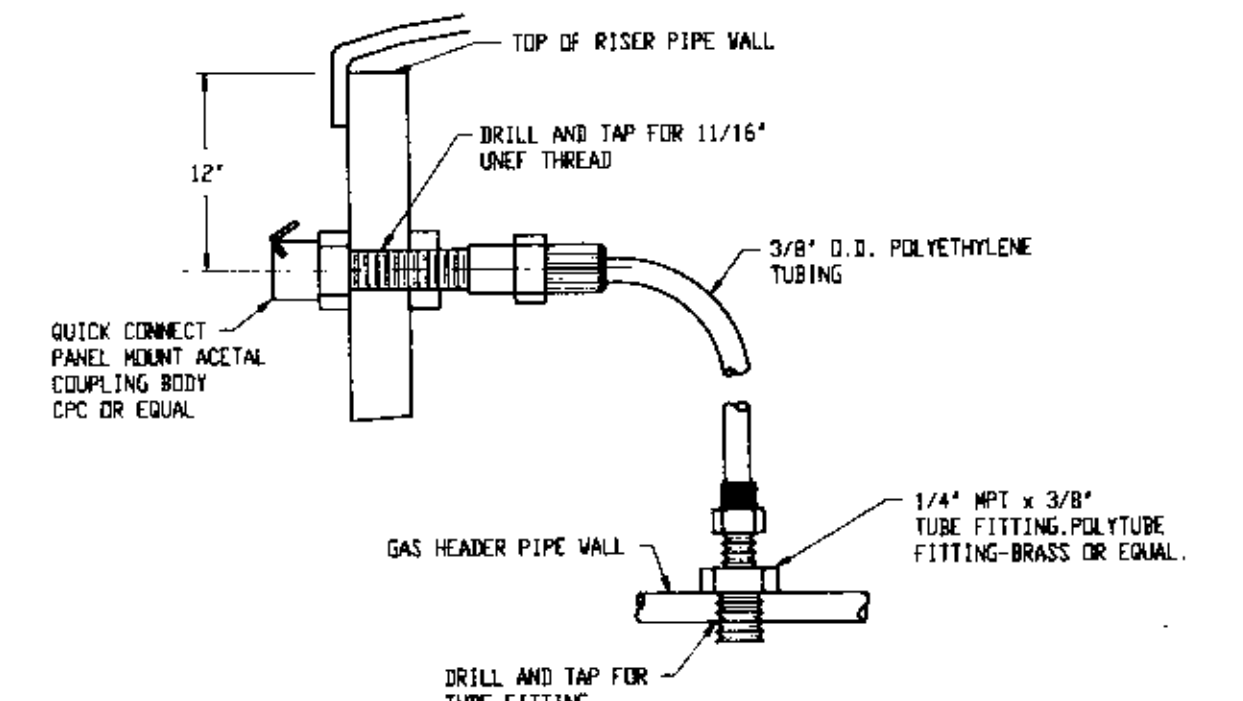
8 COLLECTION HEADER TRENCH
4



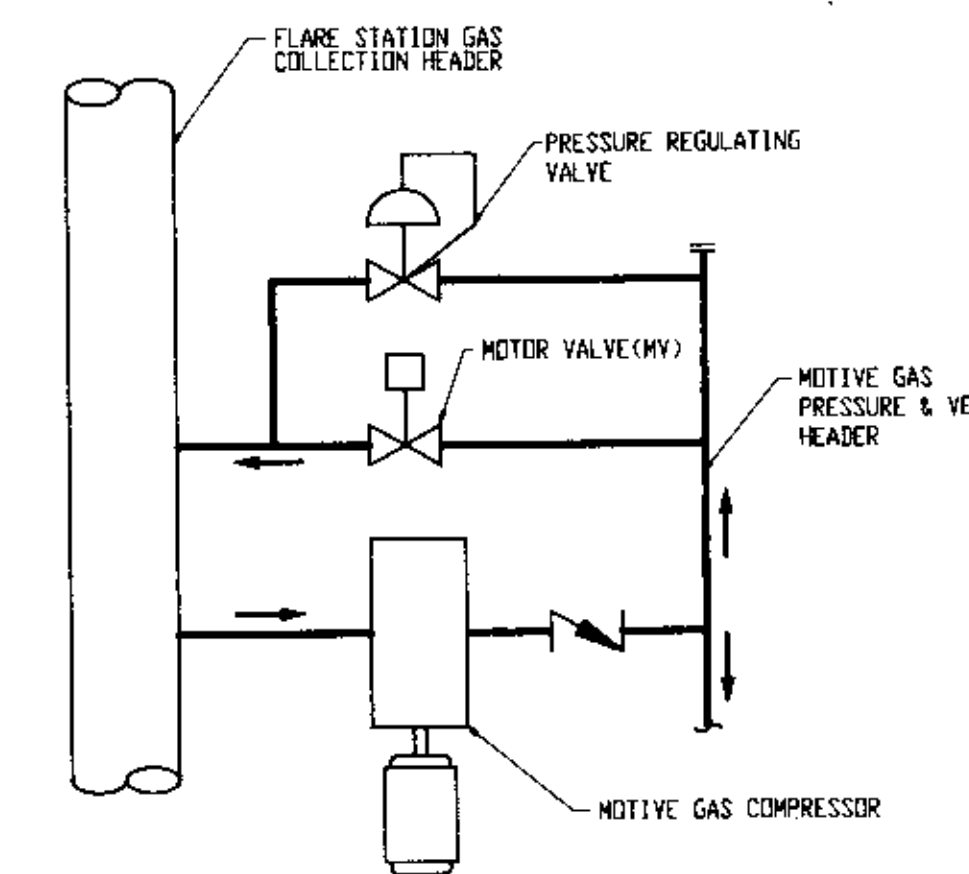
10 PERFORATION DETAIL
4



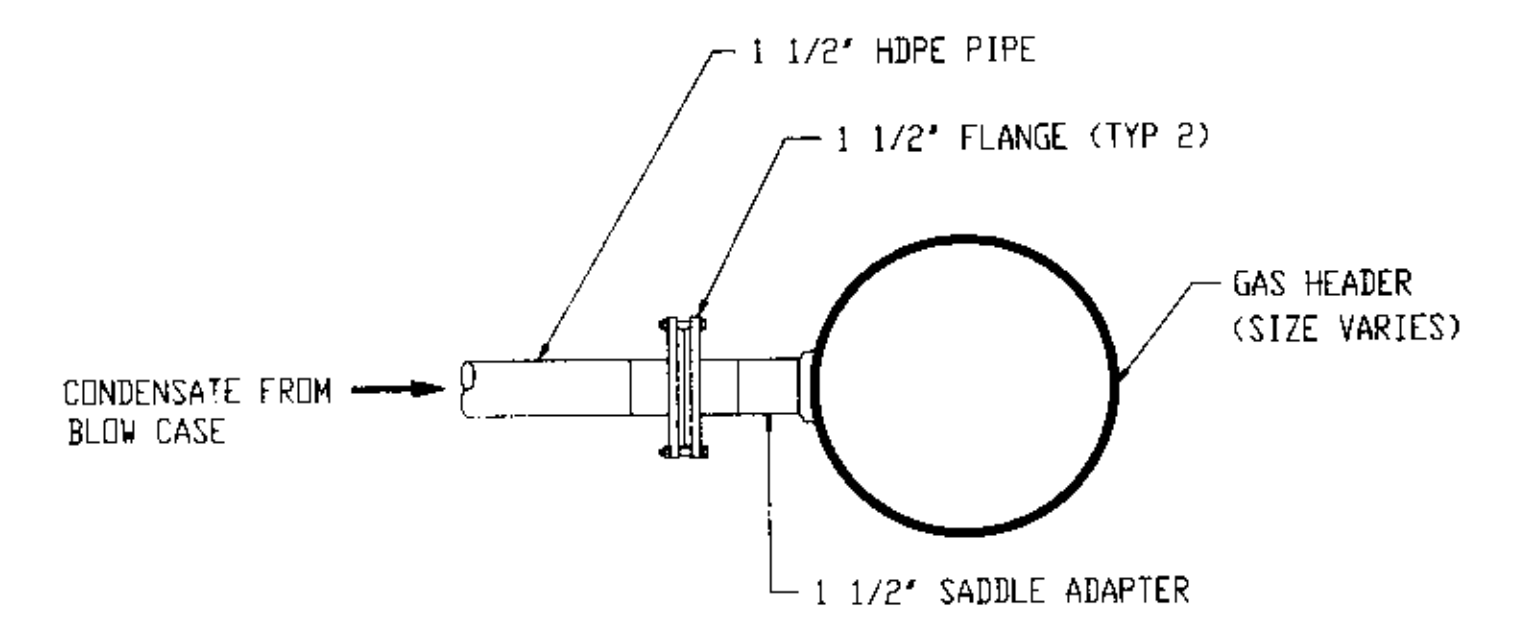
11 BLIND FLANGE
4



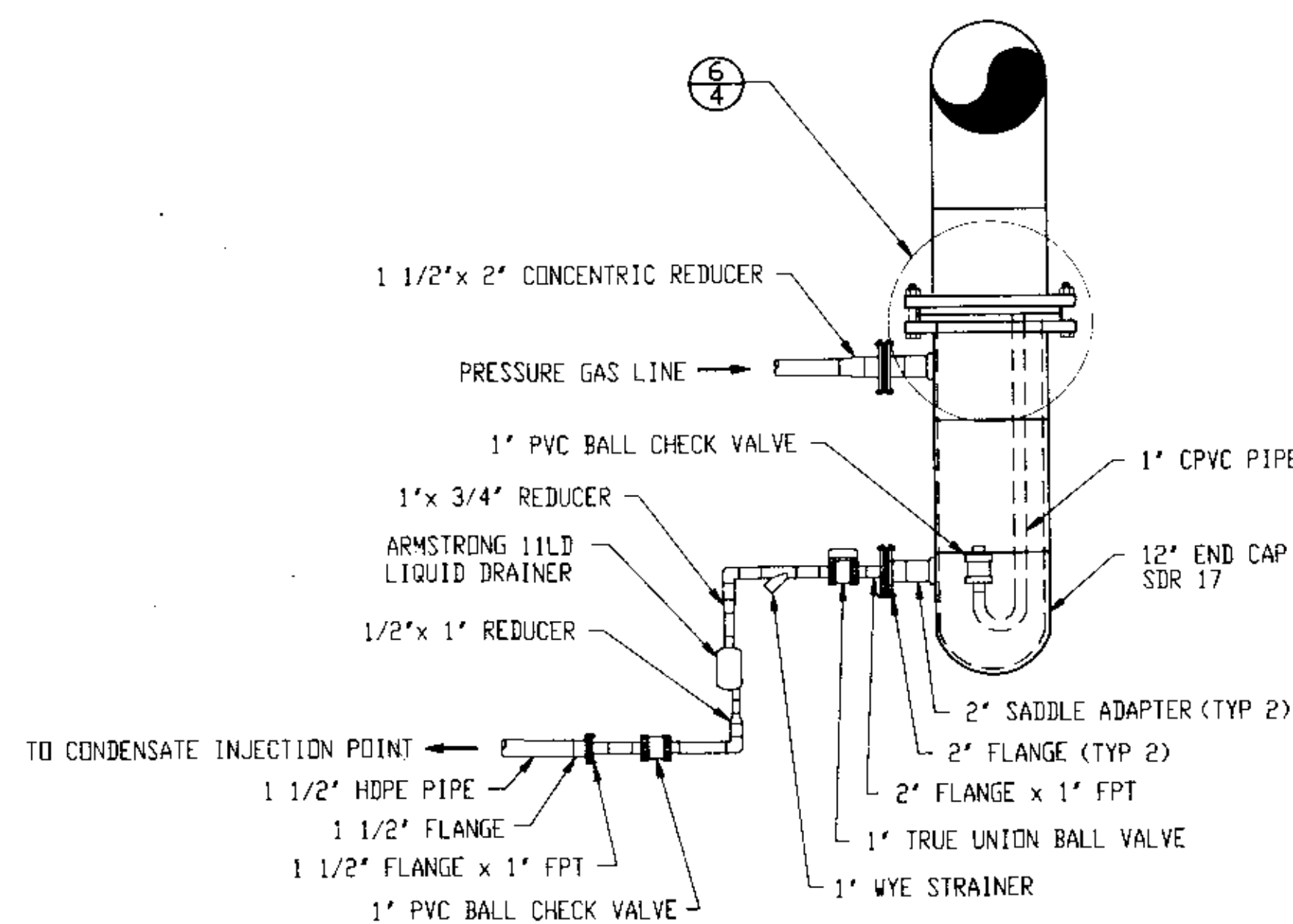
12 SAMPLING TUBE CONNECTION DETAIL
4



9 CONDENSATE MOTIVE GAS PROCESS DIAGRAM
4



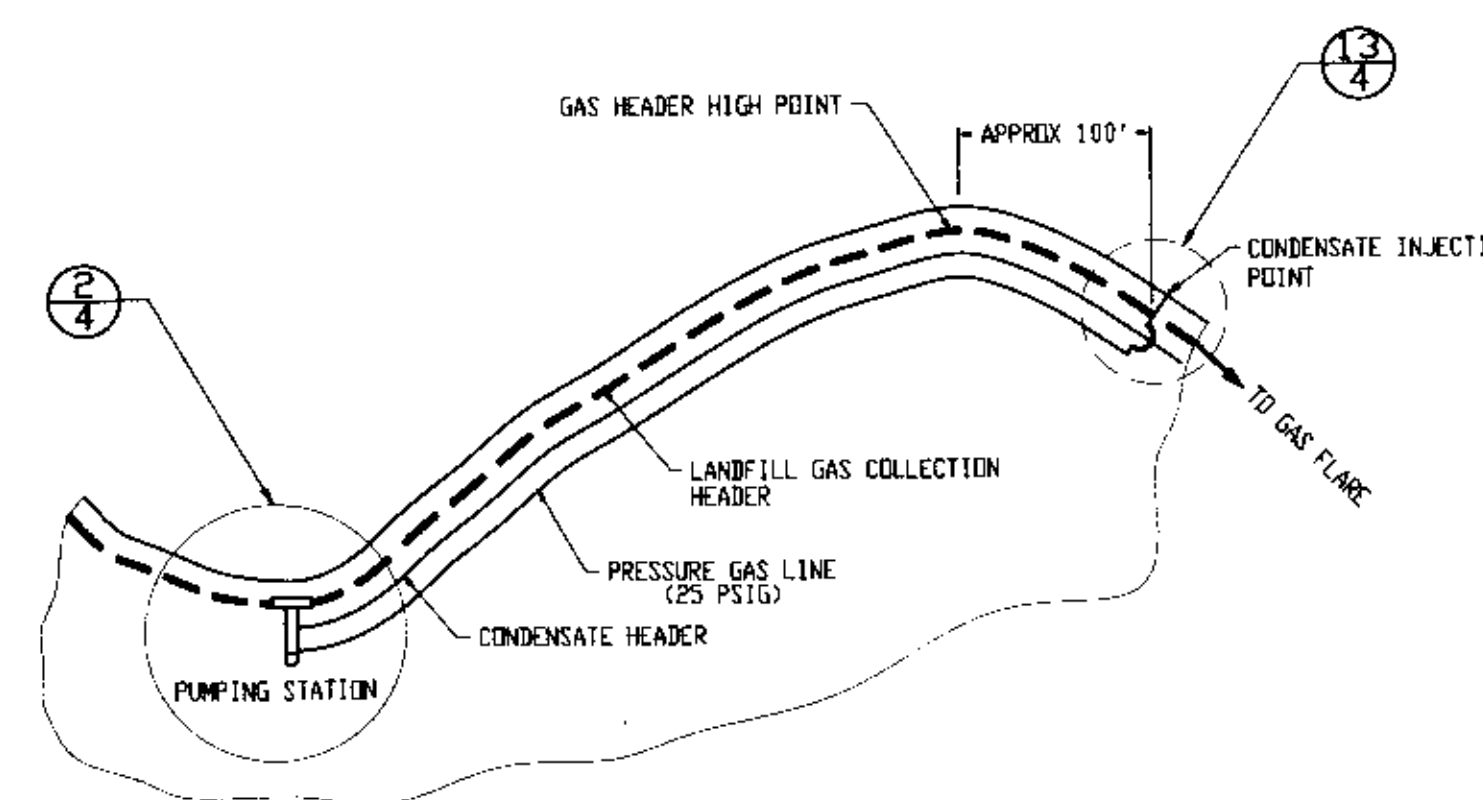
13 INJECTION POINT DETAIL
4



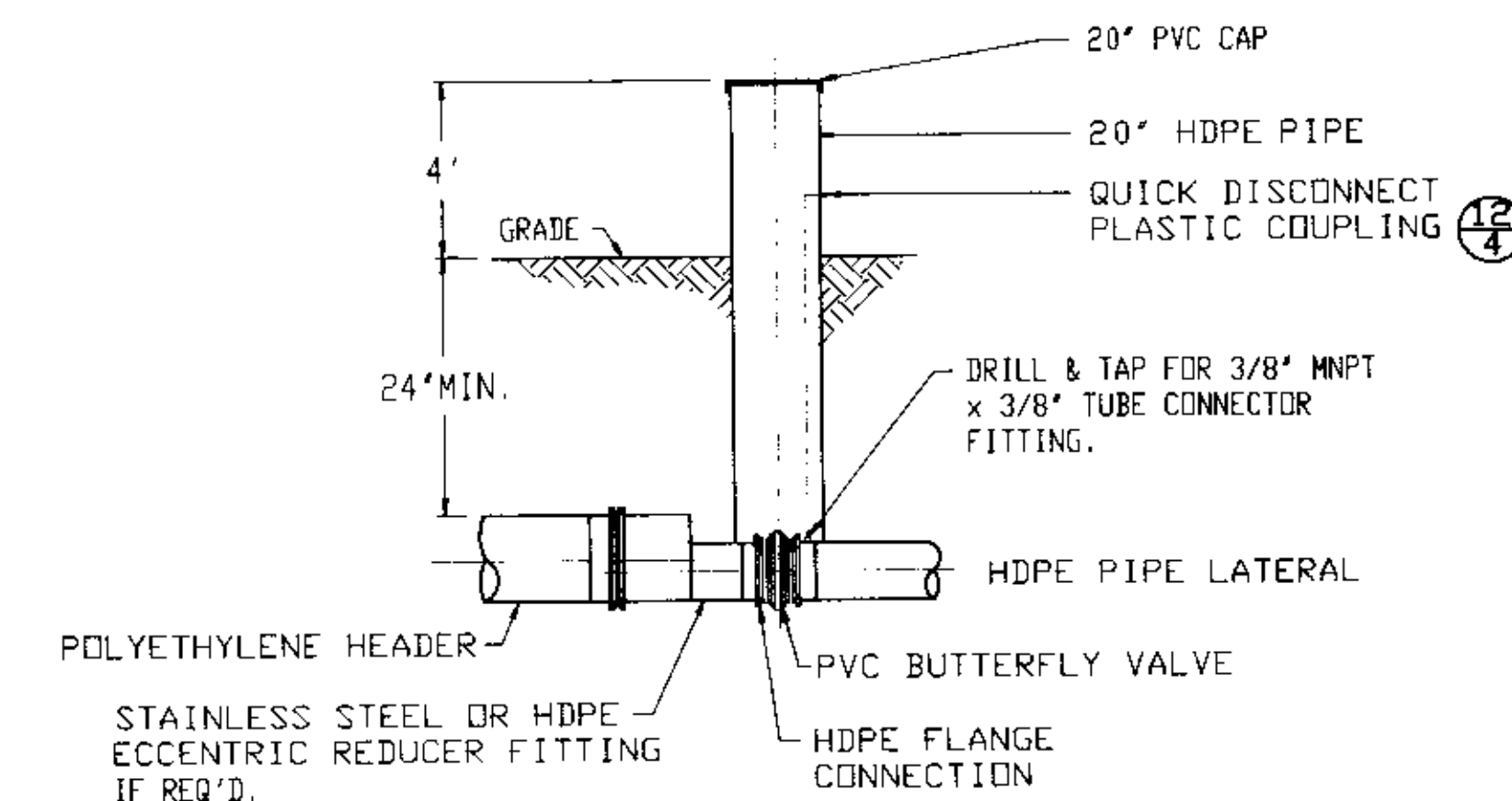
NOTE:
1. PIPE ASM. ROTATED 90° FOR VIEWING

SECTION A-A

2 CONDENSATE SUMP & BLOW CASE
4



3 CONDENSATE HEADER PROFILE (TYPICAL)
4



4 TYPICAL VALVE STATION
4

| | | | | | |
|----------|---------|----|-------------|--------|----------|
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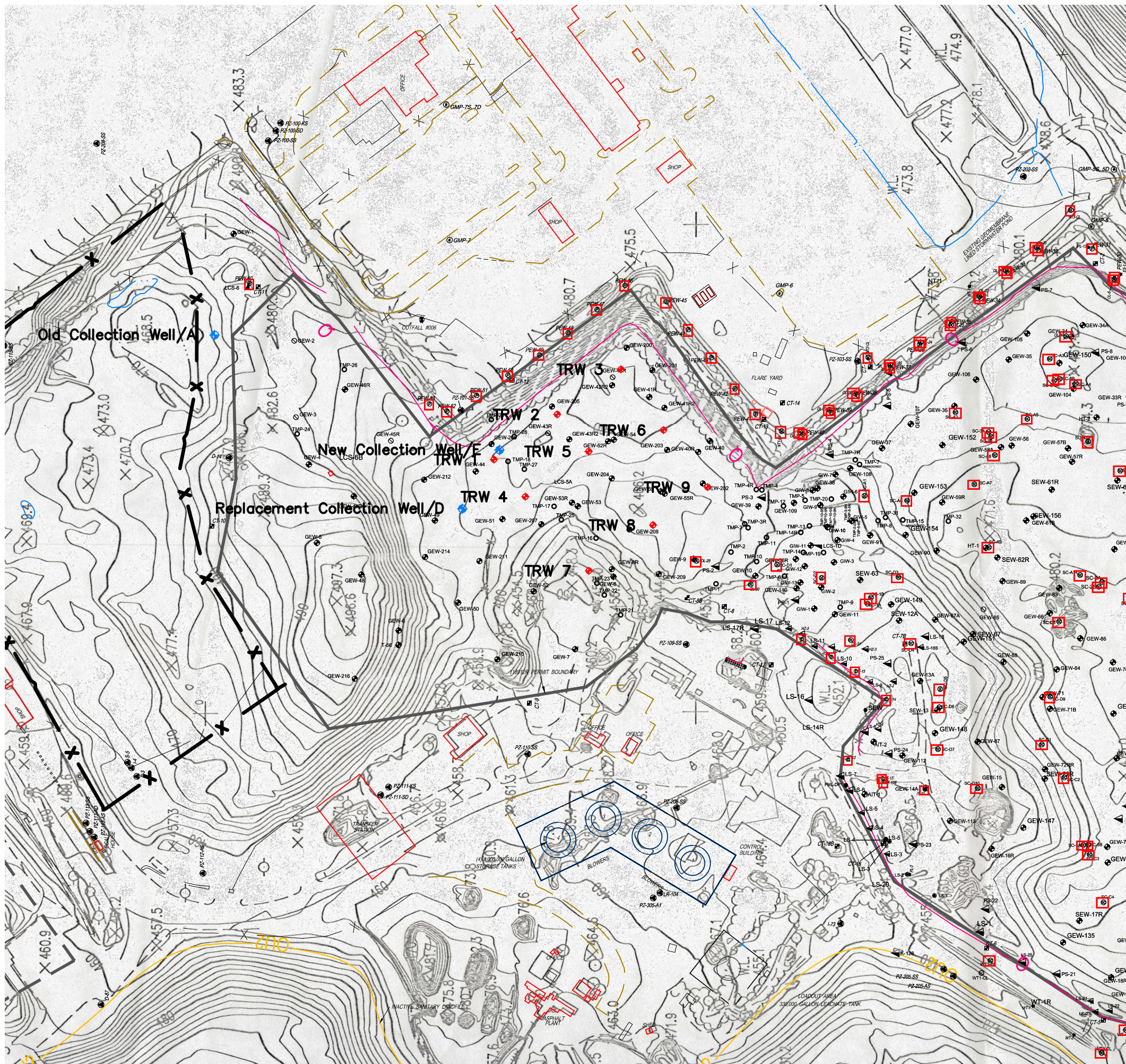
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BRIDGETON MISSOURI

GAS COLLECTION SYSTEM DETAILS
SHEET 2

Sheet No. 4
of 8 Sheets
Job No. BGTNDT

Attachment 15

RCP Location Figure



LEGEND

- ⊙ GMP-4
- ⊙ PZ-105-SS
- ⊕ GEW-38
- ⊕ GEW-85
- ⊕ SEW-63
- ⊕ PEW-20
- ⊕ CT-1
- ⊙ LS-1 ▲ LS-6
- ▲ HZ-1
- ▲ PS-15
- ▲ LCS-2D
- ⊕ SC-B1
- ⊕ TMP-9
- ⊕ GC-3
- ET-2
- ⊕ IT-7
- ⊕ PL-7
- ⊕ MB-1
- ⊕ XL-12
- TS-1
- ⊕ GIW-4
- ⊕ GIW-4

SOLID WASTE BOUNDARY
 GAS MONITORING PROBE
 PIEZOMETER MONITORING WELL
 GAS EXTRACTION WELL
 DUAL GAS EXTRACTION WELL
 SURFACE EXTRACTION WELL
 PERIMETER GAS EXTRACTION WELL
 CONDENSATE SUMP
 LEACHATE COLLECTION SUMP
 HORIZONTAL COLLECTION SUMP
 PERIMETER SUMP
 LEACHATE COLLECTION SUMP
 SURFACE COLLECTOR
 TEMPERATURE MONITORING PROBE
 SUBSURFACE RCP WELLS
 TRENCH SUMP
 INTERCEPTION TRENCH RISER
 PERIMETER LEACHATE SUMP
 WELL BORE BOOT
 TRENCH SUMP
 OVER LINER TIE IN POINT
 GAS INTERCEPTOR WELL
 TRENCH ROCK WELL (TRW)
 LEACHATE COLLECTION WELL (LCW)
 SOLID WASTE BOUNDARY

QUARRY WALL
 PARKING LOT
 LAKE
 WEST LAKE OU-2 BOUNDARY
 FENCE LINE
 BUILDING
 ROCK ROAD

NOTES:

EXISTING INFRASTRUCTURE TAKEN FROM "2015 Q2 SITE INFRASTRUCTURE SUBMITTAL" PROVIDED BY FEEZOR ENGINEERING

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