

Appendix E: Endangered Species/Critical Habitats Demonstration



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
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In Reply Refer To:
Project Code: 2023-0022822
Project Name: Alma Off-Site Disposal Facility, Phase IV Landfill

December 07, 2022

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

This response has been generated by the Information, Planning, and Conservation (IPaC) system to provide information on natural resources that could be affected by your project. The U.S. Fish and Wildlife Service (Service) provides this response under the authority of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*).

Threatened and Endangered Species

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and may be affected by your proposed project. The species list fulfills the requirement for obtaining a Technical Assistance Letter from the U.S. Fish and Wildlife Service under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the ECOS IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS IPaC system by completing the same process used to receive the enclosed list.

Consultation Technical Assistance

Please refer to our [Section 7 website](#) for guidance and technical assistance, including [step-by-step instructions](#) for making effects determinations for each species that might be present and for specific guidance on the following types of projects: projects in developed areas, HUD, CDBG, EDA, pipelines, buried utilities, telecommunications, and requests for a Conditional Letter of Map Revision (CLOMR) from FEMA.

Using the IPaC Official Species List to Make No Effect and May Affect Determinations for Listed Species

1. If IPaC returns a result of “There are no listed species found within the vicinity of the project,” then project proponents can conclude the proposed activities will have **no effect** on any federally listed species under Service jurisdiction. Concurrence from the Service is not required for **no effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.
2. If IPaC returns one or more federally listed, proposed, or candidate species as potentially present in the action area of the proposed project – other than bats (see below) – then project proponents must determine if proposed activities will have **no effect** on or **may affect** those species. For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, you can obtain [Life History Information for Listed and Candidate Species](#) on our office website. If no impacts will occur to a species on the IPaC species list (e.g., there is no habitat present in the project area), the appropriate determination is **no effect**. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.
3. Should you determine that project activities **may affect** any federally listed, please contact our office for further coordination. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header. Electronic submission is preferred.

Northern Long-Eared Bats

Northern long-eared bats occur throughout Minnesota and Wisconsin and the information below may help in determining if your project may affect these species.

This species hibernates in caves or mines only during the winter. In Minnesota and Wisconsin, the hibernation season is considered to be November 1 to March 31. During the active season (April 1 to October 31) they roost in forest and woodland habitats. Suitable summer habitat for northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥ 3 inches dbh for northern long-eared bat that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat and evaluated for use by bats. If your project will impact caves or mines or will involve clearing forest or woodland habitat containing suitable roosting habitat, northern long-eared bats could be affected.

Examples of unsuitable habitat include:

- Individual trees that are greater than 1,000 feet from forested or wooded areas,
 - Trees found in highly developed urban areas (e.g., street trees, downtown areas),
-

- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees, and
- A stand of eastern red cedar shrubby vegetation with no potential roost trees.

If IPaC returns a result that northern long-eared bats are potentially present in the action area of the proposed project, project proponents can conclude the proposed activities **may affect** this species **IF** one or more of the following activities are proposed:

- Clearing or disturbing suitable roosting habitat, as defined above, at any time of year,
- Any activity in or near the entrance to a cave or mine,
- Mining, deep excavation, or underground work within 0.25 miles of a cave or mine,
- Construction of one or more wind turbines, or
- Demolition or reconstruction of human-made structures that are known to be used by bats based on observations of roosting bats, bats emerging at dusk, or guano deposits or stains.

If none of the above activities are proposed, project proponents can conclude the proposed activities will have **no effect** on the northern long-eared bat. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records.

If any of the above activities are proposed, please use the northern long-eared bat determination key in IPaC. This tool streamlines consultation under the 2016 rangewide programmatic biological opinion for the 4(d) rule. The key helps to determine if prohibited take might occur and, if not, will generate an automated verification letter. No further review by us is necessary.

Please note that on March 23, 2022, the Service published a proposal to reclassify the northern long-eared bat as endangered under the Endangered Species Act. The U.S. District Court for the District of Columbia has ordered the Service to complete a new final listing determination for the bat by November 2022 (Case 1:15-cv-00477, March 1, 2021). The bat, currently listed as threatened, faces extinction due to the range-wide impacts of white-nose syndrome (WNS), a deadly fungal disease affecting cave-dwelling bats across the continent. The proposed reclassification, if finalized, would remove the current 4(d) rule for the NLEB, as these rules may be applied only to threatened species. Depending on the type of effects a project has on NLEB, the change in the species' status may trigger the need to re-initiate consultation for any actions that are not completed and for which the Federal action agency retains discretion once the new listing determination becomes effective (anticipated to occur by December 30, 2022). If your project may result in incidental take of northern long-eared bats after the new listing goes into effect this will first need to be addressed in an updated consultation that includes an Incidental Take Statement. If your project may require re-initiation of consultation, please contact our office for additional guidance.

Whooping Crane

Whooping crane is designated as a non-essential experimental population in Wisconsin and consultation under Section 7(a)(2) of the Endangered Species Act is only required if project activities will occur within a National Wildlife Refuge or National Park. If project activities are proposed on lands outside of a National Wildlife Refuge or National Park, then you are not required to consult. For additional information on this designation and consultation requirements, please review "[Establishment of a Nonessential Experimental Population of](#)

[Whooping Cranes in the Eastern United States.”](#)

Other Trust Resources and Activities

Bald and Golden Eagles - Although the bald eagle has been removed from the endangered species list, this species and the golden eagle are protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. Should bald or golden eagles occur within or near the project area please contact our office for further coordination. For communication and wind energy projects, please refer to additional guidelines below.

Migratory Birds - The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. The Service has the responsibility under the MBTA to proactively prevent the mortality of migratory birds whenever possible and we encourage implementation of [recommendations that minimize potential impacts to migratory birds](#). Such measures include clearing forested habitat outside the nesting season (generally March 1 to August 31) or conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

Communication Towers - Construction of new communications towers (including radio, television, cellular, and microwave) creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. However, the Service has developed [voluntary guidelines for minimizing impacts](#).

Transmission Lines - Migratory birds, especially large species with long wingspans, heavy bodies, and poor maneuverability can also collide with power lines. In addition, mortality can occur when birds, particularly hawks, eagles, kites, falcons, and owls, attempt to perch on uninsulated or unguarded power poles. To minimize these risks, please refer to [guidelines](#) developed by the Avian Power Line Interaction Committee and the Service. Implementation of these measures is especially important along sections of lines adjacent to wetlands or other areas that support large numbers of raptors and migratory birds.

Wind Energy - To minimize impacts to migratory birds and bats, wind energy projects should follow the Service's [Wind Energy Guidelines](#). In addition, please refer to the Service's [Eagle Conservation Plan Guidance](#), which provides guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities.

State Department of Natural Resources Coordination

While it is not required for your Federal section 7 consultation, please note that additional state endangered or threatened species may also have the potential to be impacted. Please contact the Minnesota or Wisconsin Department of Natural Resources for information on state listed species that may be present in your proposed project area.

Minnesota

[Minnesota Department of Natural Resources - Endangered Resources Review Homepage](#)

Email: Review.NHIS@state.mn.us

Wisconsin

[Wisconsin Department of Natural Resources - Endangered Resources Review Homepage](#)

Email: DNRRERReview@wi.gov

We appreciate your concern for threatened and endangered species. Please feel free to contact our office with questions or for additional information.

Attachment(s):

- Official Species List
 - USFWS National Wildlife Refuges and Fish Hatcheries
 - Migratory Birds
 - Wetlands
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Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Minnesota-Wisconsin Ecological Services Field Office

3815 American Blvd East

Bloomington, MN 55425-1659

(952) 858-0793

Project Summary

Project Code: 2023-0022822

Project Name: Alma Off-Site Disposal Facility, Phase IV Landfill

Project Type: Landfill - Solid Waste

Project Description: Data request for plan modification for initial permitting of coal combustion residual (CCR) landfills.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@44.289800850000006,-91.87516053879101,14z>



Counties: Buffalo County, Wisconsin

Endangered Species Act Species

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered

Clams

NAME	STATUS
Higgins Eye (pearlymussel) <i>Lampsilis higginsii</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5428	Endangered
Sheepnose Mussel <i>Plethobasus cyphus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6903	Endangered

Insects

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS National Wildlife Refuge Lands And Fish Hatcheries

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described [below](#).

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1. The [Migratory Birds Treaty Act](#) of 1918.
 2. The [Bald and Golden Eagle Protection Act](#) of 1940.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the [USFWS Birds of Conservation Concern \(BCC\) list](#) or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ [below](#). This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the [E-bird data mapping tool](#) (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found [below](#).

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Dec 1 to Aug 31
Black Tern <i>Chlidonias niger</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3093	Breeds May 15 to Aug 20

NAME	BREEDING SEASON
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Bobolink <i>Dolichonyx oryzivorus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Aug 10
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Eastern Whip-poor-will <i>Antrostomus vociferus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Golden Eagle <i>Aquila chrysaetos</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1680	Breeds elsewhere
Henslow's Sparrow <i>Ammodramus henslowii</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3941	Breeds May 1 to Aug 31
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Ruddy Turnstone <i>Arenaria interpres morinella</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds elsewhere

NAME	BREEDING SEASON
Short-billed Dowitcher <i>Limnodromus griseus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9480	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

Probability Of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

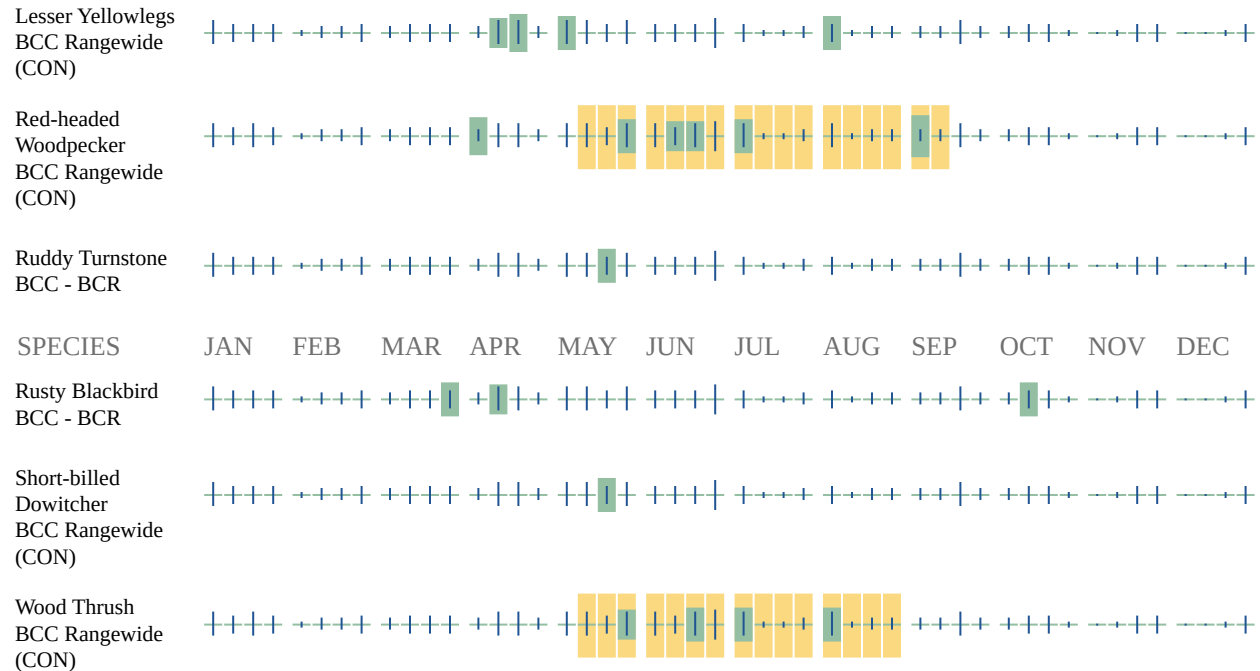
Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is $0.25/0.25 = 1$; at week 20 it is $0.05/0.25 = 0.2$.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season (■)

Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.



Additional information can be found using the following links:

- Birds of Conservation Concern <https://www.fws.gov/program/migratory-birds/species>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incident-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>

Migratory Birds FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. [Additional measures](#) or [permits](#) may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS [Birds of Conservation Concern \(BCC\)](#) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the [Avian Knowledge Network \(AKN\)](#). The AKN data is based on a growing collection of [survey, banding, and citizen science datasets](#) and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle ([Eagle Act](#) requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the [Rapid Avian Information Locator \(RAIL\) Tool](#).

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the [Avian Knowledge Network \(AKN\)](#). This data is derived from a growing collection of [survey, banding, and citizen science datasets](#).

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the [RAIL Tool](#) and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are [Birds of Conservation Concern](#) (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
 2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
 3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the [Eagle Act](#) requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).
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Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the [Northeast Ocean Data Portal](#). The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the [NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf](#) project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the [Diving Bird Study](#) and the [nanotag studies](#) or contact [Caleb Spiegel](#) or [Pam Loring](#).

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to [obtain a permit](#) to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Wetlands

Impacts to [NWI wetlands](#) and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local [U.S. Army Corps of Engineers District](#).

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

RIVERINE

- [R4SBC](#)
- [R4SBA](#)

FRESHWATER EMERGENT WETLAND

- [PEM1C](#)
-

IPaC User Contact Information

Agency: TRC Environmental Corporation
Name: Danielle Anderson
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City: West Allis
State: WI
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Appendix F: Plan of Operation Excerpts

- F.1: Plan of Operation Report Section 3.0 and 4.0 Excerpts
- F.2: Plan of Operation Plan Set
- F.3: Appendix E Excerpt – Geomembrane Compatibility
- F.4: Appendix H Excerpt – Piping and Permeability
- F.5: Appendix F Excerpt – Saturated Head Over Liner Calculation
- F.6: Appendix G Excerpt – Pipe Strength Calculations
- F.7: Appendix J Excerpt – Global Stability



Integrated
Environmental
Solutions

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Madison, WI
Telephone: 608-831-4444
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PLAN OF OPERATION

**PHASE IV DISPOSAL AREA
ALMA OFF-SITE ASH DISPOSAL FACILITY
TOWN OF BELVIDERE
BUFFALO COUNTY, WISCONSIN**

**PREPARED FOR
DAIRYLAND POWER COOPERATIVE**

**PREPARED BY
RMT, INC.
MADISON, WISCONSIN**

October 2000



Bernard J. Krantz
10/13/00

Bernard J. Krantz, P.E.
Project Manager

Joel V. Schittone

Joel V. Schittone, P.E.
Senior Engineer




Craig O. Bartholomew
10/13/00


Craig O. Bartholomew, P.G.
Project Hydrogeologist

Mark A. Osten

Mark A. Osten, P.G.
Senior Project Hydrogeologist

Certification Statement

I, , hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 500 to 536, Wis. Adm. Code.

I, , hereby certify that I am a registered professional geologist in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 10, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 500 to 536, Wis. Adm. Code.

F.1
Plan of Operation Report Section 3.0 and 4.0 Excerpts

Section 3

Engineering Design Concepts

3.1 General

The proposed landfill design has been developed to provide efficient, environmentally sound, and cost-effective ash disposal. The proposed design has been prepared to meet the following requirements: Wisconsin Administrative NR 500 series codes, WDNR Feasibility Determination Conditions, and local and site-specific conditions.

The supporting calculations for the design are referenced throughout the text and are included in the appendices. Details and drawings illustrating design layout and specifications are referenced as applicable and presented on the plan sheets and figures.

3.2 Waste Types, Volumes, and Site Life

The proposed Phase IV disposal area has an estimated design capacity of approximately 3,011,000 cubic yards based upon the proposed GCL liner and final cover design alternative. This design capacity represents the total waste (i.e., ash) volume since no daily or intermediate soil cover is required for the ash. This volume was obtained by comparing the base grades and final grades, as shown on Plan Sheets 5 and 12. Design capacity is defined as "the volume contained between the top of the 1-foot-thick granular drainage layer on the base grades and the bottom of the 3-foot-thick final cover."

The proposed landfill will accept bottom ash and fly ash from DPC's Genoa No. 3, Alma Units 1-5, and John P. Madgett (JPM) power generating facilities. Other than small quantities of wastewater treatment plant sludge and asbestos (less than 1 percent of the total waste stream), no other solid or hazardous waste as defined by the WDNR will be disposed of in the proposed Phase IV disposal area. Disposal of these waste types is consistent with DPC's current landfill operating practices.

The types of coal used by DPC can vary throughout time. Different types of coal will generate different amounts of ash, with different properties. The type of ash generated can therefore affect the rate of beneficial use (i.e., nonlandfill applications), as will market conditions. The projected annual ash volumes to be placed in the landfill have been estimated by DPC and RMT to average approximately 156,600 dry tons or 217,000 in-place cubic yards of ash per year. The anticipated site life is 13.9 years with an anticipated final closure date of September 2015.

Depending on the type of coal used and the market conditions for beneficial reuse, these ash disposal volumes may vary from year to year.

In the FR, it was estimated that ash filling would begin in Phase IV during the year 2004. On the basis of current ash generation projections, and updated estimates of remaining existing landfill capacity, DPC will now need to begin ash filling in Phase IV in the fall of 2001. Because of the fluctuations in ash generation and the rate of beneficial use, 217,000 in-place cubic yards per year is still considered a representative estimate of average ash disposal.

3.3 Site Development

The proposed Phase IV disposal area consists of approximately 32.1 acres of disposal area. The layout of the landfill is shown on Plan Sheets 4 and 5 (subbase and base grades). The landfill will be developed and operated as an area fill and will be developed generally from east to west over four cells (i.e., Cell 1, Cell 2 - Modules A and B, Cell 3, and Cell 4 - Modules A and B). Phasing sheets for site development are shown on Plan Sheets 6 to 11. Table 1 in Appendix C summarizes the estimated design capacity by cell.

The phased development of the landfill has the following advantages:

- The landfill will be constructed, operated, and closed in segments.
- Construction costs will be distributed throughout the facility's life.
- Areas to be maintained for ash filling will be smaller.
- As cells (or modules) reach closure grades, they may be capped with temporary intermediate cover if needed to minimize leachate generation and to divert clean surface water to the surface water management system. The final cover system will be completed in the subsequent construction season.

The proposed horizontal limits of ash filling are shown on Plan Sheet 5 (base grades). The horizontal limits of filling have been established based on topographic constraints and operational constraints. The proposed subbase (bottom of compacted 2-foot-thick select low-permeability subbase soil layer [low-permeability layer]) grades have been developed to provide a minimum separation distance of 10 feet from the seasonal high groundwater table or the top of the bedrock surface, whichever is highest.

Initial site development will include constructing storm water management structures, site access roads and Cell 1. Surface water controls consisting of ditches, diversion berms, and erosion control measures (e.g., silt fence, hay bale check dams, and seeding of disturbed areas) will be developed prior to Cell 1 construction to collect and divert surface water runoff from the construction areas and control erosion from the site.

The topsoil in Cell 1 will be stripped and stockpiled for future use. Cell 1 will then be excavated to subbase grades. Subbase grades are shown on Plan Sheet 4. Select loess soil obtained from the excavation will be used to construct the low-permeability layer. General fill obtained from the excavation will be used to construct the perimeter berms, access roads, and storm water management structures. Once subbase grades are established, the liner system, leachate collection system, and leachate transfer system will be constructed. Construction activities will be documented in accordance with applicable NR 500 requirements and the Construction Quality Assurance Plan (CQA Plan), which has been developed as part of this POO (Appendix D).

Surface water drainage from areas within the watershed will be routed around the landfill in diversion ditches. The construction of these ditches will be phased with the landfill construction as shown on Plan Sheets 6 through 11 and as described in Subsection 4.9. These ditches have been designed for the 100-year, 24-hour storm event.

3.4 Materials Balance

The materials balance for the proposed Phase IV disposal area is presented in Appendix C. This appendix provides information on the materials needed and on which materials are available on-site for construction. The following assumptions were used to develop the materials quantities:

1. No soil for daily or immediate cover is required.
2. All volumes are in-place cubic yards, neglecting shrink/swell factors and handling losses.
3. Design capacity is defined as the volume available for ash.

The materials balance for the site indicates that the on-site excavations will provide enough material to complete construction of the low-permeability layer component of the liner for each of the cells. On-site excavations and existing stockpiles will provide enough general fill material to complete construction of the final cover grading layer and the general fill cover layer components of the final covers for each of the cells, and for construction of perimeter berms, drainage ditches/diversion berms, sedimentation basins, and other appurtenances.

As indicated in Tables 2 and 3 in Appendix C, excavation in some cells will not provide an adequate volume of material for the low-permeability layer and general fill construction. For these cells, supplemental material needed will be excavated from future cell areas.

In cells where there is an excess of soil excavated during development of the landfill, the soil will be stockpiled on-site, as shown on Plan Sheets 6 through 11. Stockpiles will be surrounded by erosion control features, such as berms, sediment fences, and hay bales, as shown on the

phasing plans and on Plan Sheet 23. Stockpiles that will remain dormant for more than one construction season will be seeded to establish vegetation to minimize erosion.

Select granular fill (drainage layers of liners and covers), select aggregate fill (pipe bedding), select graded fill (if needed), base course, and riprap will be obtained from locally available commercial sources.

The design capacity of the proposed landfill is approximately 3,011,000 cubic yards. Table 1 in Appendix C summarizes the design capacity by cell. In accordance with NR 506.05(2) and NR 506.06, high-volume industrial waste landfills, including the proposed DPC Phase IV disposal area, are not subject to daily and intermediate cover requirements, respectively. Since the waste consists almost entirely of coal ash (approximately 99 percent), the use of daily and intermediate cover soil to control odors will not be required. If temporary intermediate cover is used, it will be subsequently used as the 0.5-foot grading layer soil component of the final cover or for structures within the waste limits.

3.5 Subbase Grades

The subbase grades (i.e., bottom of the low-permeability layer) have been designed to provide a minimum separation distance of 10 feet from the seasonal high groundwater table or the top of the bedrock surface, whichever is highest (Plan Sheet 4). Elevations of the subbase excavation range from approximately 780 feet mean sea level (M.S.L.) in the southern portion of the site to about 862 feet M.S.L. in the northern portion of the site, with a maximum cut below existing grade of approximately 60 feet. The maximum excavation area is in the location of an existing stockpile in Cell 1 and Cell 2, Module B.

During subbase preparation, excavated soil will be used in the construction of the site (i.e., low-permeability layer, perimeter berms, surface water management features, final cover, or other exterior features) or stockpiled for later use as described in Subsection 3.4.

3.6 Base Grades

The base grades over the landfill site range from elevations of approximately 782 to 864 feet M.S.L. Base grades representing the top of the composite liner, along with the leachate collection system, are shown on Plan Sheet 5. As shown, base grades will have a 2 percent minimum slope with a majority of the base at 6 percent and a horizontal distance of approximately 130 feet from the ridges to the leachate collection pipes. NR 504.06(5)(a) allows for flow distances to exceed 130 feet across the base of the liner for well designed composite-lined landfills. The proposed base grade slopes meet or exceed the minimum of 2 percent to collection lines, which will provide better flow of leachate to collection pipes. Subsection 3.8 provides additional details regarding the design of the leachate collection system.

3.7 Composite Liner System

Under the provisions of NR 504.10, an alternative liner system design is proposed. The proposed system will consist of a composite liner system placed along the base and interior slopes of the landfill. The composite liner will consist of a geosynthetic clay liner (GCL) overlain by a 60-mil high-density polyethylene (HDPE) geomembrane. The composite liner will be installed over a low-permeability soil layer (see Detail 1 on Plan Sheet 17). The low-permeability layer will be obtained from on-site material excavated within the Phase IV footprint having a maximum hydraulic conductivity of 1×10^{-5} cm/s. The composite liner system will function as the primary containment system.

3.7.1 Low-permeability Layer

The low-permeability layer will be placed directly below the GCL layer. This layer will be placed in accordance with the CQA Plan (refer to Appendix D). During the placement of the low-permeability layer, clump and stone sizes within the soil will be limited to 2 inches or less as described in the CQA Plan. The final lift of the low-permeability layer, including the vee trenches constructed for the leachate collection system piping, will be smooth drum-rolled, and coarse gravel or cobbles larger than 1 inch in diameter and ruts greater than 1 inch in depth will be removed from the surface prior to placement of the GCL in accordance with WDNR Guidance for the Use of GCLs and manufacturers' recommendations. Refer to Subsection 4.6.1 for further discussion on the construction of the low-permeability layer. Details of the liner are shown on Plan Sheet 17.

3.7.2 Geosynthetic Clay Liner

A GCL placed above the low-permeability layer and in conjunction with the geomembrane, discussed in Subsection 3.7.3, will constitute the composite liner system. As allowed in NR 504.10, the GCL and the low-permeability layer discussed above will be installed in lieu of the clay layer described in NR 504.06. The GCL will be installed in accordance with Subsection 4.6.3 of this report and the CQA Plan (refer to Appendix D), which was prepared in accordance with the Bureau of Waste Management's "Guidance for the Use of Geosynthetic Clay Liners (GCLs) at Solid Waste Facilities" and manufacturers' recommendations. Material specifications from some of the acceptable manufacturers are contained in Appendix E.

The GCL will consist of a layer of pure sodium bentonite encapsulated between two geotextiles, which will meet the minimum physical characteristics found in the CQA Plan. In addition, the GCL will be the same or equivalent to that used in the chemical compatibility testing found in the FR Addendum dated December 15, 1997 (RMT,

1997c). The results of that test indicated that the leachate from DPC would not adversely affect the performance of the GCL.

As a result of a recent change in the coal source utilized by DPC, additional synthetic leachate generation and leachate quality testing using representative ash samples is currently underway. This testing is being performed to verify that leachate characteristics have not significantly changed due to the change in coal source. The results of this testing will be submitted to the WDNR when available. If necessary, additional GCL compatibility testing will be performed to verify GCL compatibility with the new leachate.

3.7.3 60-mil HDPE Geomembrane

A 60-mil HDPE geomembrane liner will be placed directly above the GCL. The base geomembrane liner will consist of smooth geomembrane, while the geomembrane on the sidewalls will be textured for added stability. The geomembrane will be protected from abrasion and ultraviolet degradation by a 1-foot-thick select granular fill drainage layer overlying the geomembrane. Details of the geomembrane liner are shown on Plan Sheet 17.

Design calculations for the stability of the textured geomembrane/low-permeability layer and textured geomembrane/select granular fill (granular drainage layer) interfaces are included in Appendix J. Material specifications from some of the acceptable manufacturers are contained in Appendix E. The geomembrane liner will meet the minimum physical, mechanical, endurance, and degradation properties presented in the CQA Plan (Appendix D).

HDPE geomembrane has been included in the design and construction of numerous nonhazardous waste facilities. Testing of the compatibility of the HDPE geomembrane with the leachate generated from this type of facility has been performed by geomembrane manufacturers, suppliers, and industry users. Test results indicate that the leachate from a typical nonhazardous waste disposal facility will not adversely affect the performance of the HDPE geomembrane liner. Geomembrane chemical resistance data are presented in Appendix E.

The geomembrane liner will be deployed above the GCL. In general, geomembrane panels will be placed in an orientation that runs directly down the sideslopes. A preconstruction report with a proposed panel layout diagram will be prepared and submitted to the WDNR prior to installation of the geomembrane.

As placement proceeds, the geomembrane will be anchored as shown on Detail 3 of Plan Sheet 17. Additional testing and installation requirements are detailed in Subsection 4.6.4 and in the CQA Plan in Appendix D. Following geomembrane installation, the select granular fill drainage layer will be installed to protect the geomembrane.

3.8 Leachate Collection and Handling System

3.8.1 General

The primary design criteria for the leachate collection system is to maintain the average leachate head on the liner system to less than 12 inches (s. NR 504.06[5][a]). To achieve this, the leachate collection system for the proposed landfill has been designed to provide effective drainage, collection, and removal of leachate from the landfill. The primary components of the leachate collection system consist of a drainage layer, leachate collection and transfer piping, cleanouts, manholes, a storage tank, a load-out facility, and leachate head wells.

The leachate collection system layout is shown on Plan Sheet 5, and the associated details are shown on Plan Sheets 17 and 18. Additional information concerning the leachate collection system is presented in the following subsections. A discussion of the construction of the leachate collection system is presented in Subsection 4.7.

3.8.2 Leachate Generation

Leachate generation has been estimated in accordance with NR 512.12(3), where 6 inches per year of impingement into the leachate collection system were assumed for all unclosed areas, while 1 inch per year was assumed to impinge the collection system under closed areas (i.e., for composite liner and final cover designs) (Appendix F). A generation rate of 3 inches per year was assumed on intermediate slopes due to the relatively steep (3:1) slopes and the characteristics (i.e., low hydraulic conductivity) of the ash. On the basis of these assumptions, the rate of leachate generation during active landfill operations at the DPC Phase IV disposal area is estimated to be as high as approximately 9,120 gallons per day (gpd) during Cell 4, Module B operations. Because of the relatively high moisture-holding capacity of the ash, the actual leachate generation rate during site operations is expected to be less than that estimated above. Other factors that will affect the actual leachate generation rate will include the ash filling rate, the total annual precipitation, and the evaporation rate.

The leachate generation rate after final closure is estimated to be approximately 2,388 gpd based on the 1 inch-per year impingement rate. Based on case studies at closed landfills, this post-closure flow rate is extremely conservative, and actual flow rates during closure are expected to be less.

3.8.3 Leachate Collection System

The leachate collection system consists of a select granular fill drainage layer, a network of leachate collection piping, and cleanout access piping. The select granular fill drainage layer will be placed over the geomembrane on the base and sidewalls. The granular drainage layer will be sloped at a minimum slope of 2 percent to the leachate collection trenches and pipes as shown on Plan Sheet 5. The drainage layer promotes the efficient transmission of leachate to the leachate collection trenches and pipes. The select granular fill drainage layer will be a minimum of 12 inches thick and will have a minimum hydraulic conductivity of 1.0×10^{-2} cm/s. The select granular fill drainage layer material will meet the specifications presented in the CQA Plan (Appendix D). To protect this layer, DPC will place a minimum 2-foot layer of bottom ash, fly ash from the JPM Station, or a mixture of JPM and Alma fly ash over the select granular fill.

The leachate collection piping will be placed in vee-trenches in accordance with s. NR 504.06(5)(d) (refer to Detail 1 on Plan Sheet 17). The trenches will be 18 inches deep with maximum 3:1 sideslopes. A 12-ounce nonwoven polypropylene geotextile will be placed directly on the geomembrane liner along the entire length of the trench to provide protection for the geomembrane. The composite liner will be continuous beneath the vee-trench by undercutting the subbase along the length of the trench to maintain the 2-foot-thick low-permeability layer.

The leachate collection piping will consist of 6-inch-diameter perforated SDR 17 HDPE pipe. Pipe capacity and strength calculations are contained in Appendices F and G, respectively. The perforated collection pipe will have 3/8-inch-diameter holes on the bottom of the pipe, set 45° from center, and spaced 6 inches on center as shown on Plan Sheet 17. A minimum of 4 inches of bedding material will be placed below the perforated collection pipe in the trenches. Pipe bedding material will be placed around the perforated pipe and mounded a minimum of 1 foot above the pipe as shown on Plan Sheet 17. A 6-inch-thick layer of select graded fill will be placed over the pipe bedding material, if needed for filtering the select aggregate fill material. The select aggregate fill, or the select graded fill, if used, will then be covered by the select granular fill drainage layer. The piping and pipe bedding material, and select graded fill will meet the specifications presented in the CQA Plan (Appendix D).

Piping and permeability calculations were performed for the select granular fill, select aggregate fill (pipe bedding material), and leachate collection piping perforations. These calculations are included in Appendix H. Based on these calculations, the select granular fill/pipe bedding material design will provide adequate hydraulic conductivity for leachate collection without excessive migration of fines to clog the pipe bedding material or the leachate collection pipes. Grain-size distribution tests will be performed on the select granular fill, select graded fill, and pipe bedding materials used in construction to confirm this. Calculations were also performed to verify that the average leachate head on the liner is limited to 1 foot or less. These calculations are included in Appendix H.

The proposed layout of the leachate collection piping is shown on Plan Sheet 5. Leachate lines in each cell will be placed parallel to each other in valleys over the herringbone design across the base. In general, the leachate piping layout has been designed such that the leachate flows no more than 130 feet across the base of the liner before encountering a leachate collection pipe. In a few locations, the flow distance exceeds 130 feet. However, these are limited and are considered acceptable for this well designed composite landfill. The leachate collection lines are sloped at a minimum of 4.0 percent toward the low point in Cell 4, and at a minimum of 6.0 percent in Cells 1, 2, and 3. Each cell contains leachate collection lines that run in a north-northeast to south-southwest orientation. These lines all drain at a 4.0 to 6.0 percent slope and penetrate the composite liner at the southern end of each cell. At the penetration points, each penetration will be constructed with a geomembrane apron and sleeve (i.e., pipe boot) with extrusion welds, a neoprene seal, and geomembrane rub sheets (Detail 2 on Plan Sheet 17 and Detail 6 on Plan Sheet 19).

Perimeter cleanouts for all leachate collection pipes will be installed at each end of the pipe allowing each collection line to be cleaned out in both directions. In addition, midline cleanouts will be provided to the longest collection lines in Cell 3 and Cell 4. The maximum collection pipe cleanout length is approximately 1,200 feet from the entrance of the cleanout to the toe-of-slope on the opposite side of the landfill.

The cleanout risers and midline cleanouts consist of 6-inch-diameter nonperforated 6-inch SDR 17 HDPE pipe. The cleanout risers and midline cleanouts will be installed in trenches on the base and on the sideslopes as shown on Detail 6 on Plan Sheet 17. Cleanout locations are shown on Plan Sheet 5.

Temporary cell delineation berms will be used along the cell boundaries illustrated on Plan Sheets 6 through 11 to control surface water runoff and minimize leachate generation, and to protect the composite liner splice area for successive cell construction.

Refer to Detail 5 on Plan Sheet 17 for further details on the temporary cell delineation berm design.

3.8.4 Leachate Removal and Transfer System

The leachate removal and transfer system consists of nonperforated leachate transfer piping, manholes, and cleanout access piping. The perforated leachate collection piping will transition to 6-inch-diameter nonperforated SDR 17 HDPE leachate transfer piping within the landfill just prior to where the transfer piping penetrates the liner system at the southern toe-of-slope of each cell. The horizontal pipe penetration has been designed to prevent leachate from leaving the landfill liner system through the liner penetration by implementing the following design features:

- An HDPE pipe boot will be installed at the location where the transfer piping exits the liner (see Detail 6 on Plan Sheet 19).
- Outside of the subbase grades (i.e., the bottom of the 2-foot-thick low-permeability layer), the transfer piping will be wrapped in a GCL for a distance of 23 feet beyond the subbase grades (see Details 2 and 4 on Plan Sheet 17).
- Approximately 8 feet from the bottom of the low-permeability layer, a ½-inch-thick HDPE panel (i.e., anti-seep collar) will be fused perpendicular to the orientation of the transfer piping. The GCL will wrap around the pipe from the pipe boot to the anti-seep collar where the transfer pipe will transition from a single-wall pipe to a double-wall pipe (see Details 2 and 4 on Plan Sheet 17).
- Approximately 1 foot beyond the HDPE anti-seep collar and GCL wrap, an 8-inch-diameter casing pipe will be installed around the 6-inch-diameter transfer piping. The remainder of the transfer piping (i.e., outside of the landfill liner) will be double encased (see Details 2 and 4 on Plan Sheet 17).
- The GCL-wrapped transfer piping, the HDPE anti-seep collar, and the transition to the double-encased piping system will all be encased in a horizontal extension of the low-permeability layer for a distance of 24 feet beyond the subbase grades (see Details 2 and 4 on Plan Sheet 17).

Outside of the limits of ash on the opposite side of the landfill perimeter berm, a 4-foot-diameter concrete manhole will be installed to provide a location for major changes in direction of the transfer piping, to provide a location for transfer piping to manifold into a single perimeter transfer pipe around the southern end of the landfill, and to provide a location for cleanout access piping. These manholes will also provide access to monitor the interstice between the transfer casing pipe and the transfer carrier pipe. Seven manholes are illustrated on Detail 2 on Plan Sheet 18, and manhole locations are shown on Plan Sheet 5.

The transfer piping from all of the cells meet at Manhole MH 3 located south of Cell 2. The combined transfer piping then extends to the leachate storage tank located near the ash processing facility. Transfer piping will be installed in a trench as shallow as practical, but will be located below frost depth. Leachate flows by gravity to the leachate storage tank. The leachate transfer piping, manholes, and storage tank will be constructed above the seasonal high water table. Plan Sheet 5 illustrates the location of the transfer piping, manholes, and the storage tank.

Within Manhole MH 5, located just upstream of the leachate storage tank, two actuated valves will be installed on the leachate transfer pipe. One valve will close if the high-level alarm is triggered in the storage tank, and the second valve will close if the high-high-level alarm is triggered in the tank. Both valves will fail closed if the power goes out at the tank (see Subsection 3.8.5). These valves will shut off the gravity flow of leachate to the storage tank, preventing overflow of the tank, if the tank becomes full or if power goes out at the tank. The second valve provides redundancy for the same function. Both valves will be compatible with the landfill leachate and will be accessible from the ground surface.

3.8.5 Leachate Storage, Loadout, Use, and Disposal

As discussed in Subsection 3.8.4, the site is designed to gravity-drain leachate to a proposed underground leachate storage tank located near the existing ash processing facility (see Plan Sheet 5). Leachate generation calculations (refer to Appendix F) indicate that a 30,000-gallon tank will be needed to provide a minimum 4-day storage capacity based on the peak leachate generation rate estimated for the site (when Cell 4B is operational, portions of Cell 4A has intermediate cover, and Cells 1 through 4A are closed). The leachate storage provided will allow for the temporary storage of leachate during nights, weekends, and holidays.

The leachate storage tank will consist of a double-walled tank (see Detail 1 on Plan Sheet 18). The interior of the tank will be coated with epoxy or another liner material compatible with the leachate. The dual-wall construction of the corrosion-resistant tank will allow for leak detection monitoring of the interstitial space between the inner and outer walls. The tank will provide access to allow for sampling of the leachate. The storage tank will be bedded in select granular fill (e.g., clean sand, pea gravel, No. 8 crushed stone, or equivalent) and will be held in-place by tie-down straps and concrete deadmen. The tank will be designed to withstand the soil and liquid loads encountered during installation and use. Tank installation methods will follow the manufacturer's recommended procedures. Representative manufacturers' information is included in Appendix E.

A submersible pump will be located inside the tank and will pump leachate through 3-inch-diameter SDR 17 HDPE discharge piping encased in 6-inch-diameter SDR 17 HDPE piping to existing piping located near the processing facility. Currently, ash processing water is pumped from the existing runoff sedimentation pond to either the processing facility or to the existing overhead loadout structure (used to top-load tanker trucks). The discharge piping from the proposed leachate storage tank will tap into the existing piping so that DPC can direct the Phase IV leachate to either the processing facility or the loadout structure. Valves will be installed to direct the leachate to the appropriate location for its intended use. See Detail 5 on Plan Sheet 21 for a piping schematic.

As shown on Detail 1 on Plan Sheet 18, the leachate storage tank will contain three liquid level sensors, which will function as follows (from highest to lowest):

- High-high alarm - will close one of the actuated valves contained in Manhole MH 5 to be installed on the leachate transfer piping entering the storage tank and will trigger a red alarm light
- High alarm - will close the second actuated valve contained in Manhole MH 5, also to be installed on the leachate transfer piping entering the storage tank. This sensor will also trigger a red alarm light
- Pump-off - will turn the pump off to ensure that the pump remains submerged

The pump will be turned on manually by DPC operations personnel.

The Phase IV leachate will be utilized and managed by DPC the same as runoff sedimentation pond water is currently managed. It will be utilized for conditioning ash prior to landfilling and/or it will be used for dust control in the active fill areas. If more leachate is produced than can be utilized on-site, it will be hauled via tanker truck to the DPC wastewater treatment plant (WWTP) located in Alma, Wisconsin, for treatment and disposal. If for some reason the DPC Alma WWTP is not available to accept the leachate, a secondary off-site disposal site will be the LaCrosse WasteWater Utility WWTP, located in LaCrosse, Wisconsin. A conditional approval letter from the LaCrosse WasteWater Utility is contained in Appendix I. The volume of leachate used on-site and hauled off-site to either WWTP for treatment will be recorded and submitted to the WDNR. All pumps, valves, and meters will be controlled and operated from the ground surface.

3.8.6 Leachate Head Wells

Leachate head monitoring wells will be installed to monitor the hydraulic head of the leachate generated in the landfill. Two leachate head monitoring wells will be installed

in each cell of development, for a total of eight head wells. The proposed locations of the head wells are shown on Plan Sheet 5.

The head wells will consist of a 3-inch-diameter Schedule 120 nonperforated PVC pipe with a 5-foot slotted pipe section for the screen. The 3-inch-diameter sidewall riser pipe will provide a conduit for standard monitoring equipment access (see Detail 6 on Plan Sheet 17).

The well piping will be bedded at the base of the select granular fill drainage layer of the leachate collection system. The nonperforated connecting pipe will be constructed at a level grade toward the toe of the perimeter berm sidewall. Each casing will be sealed with a threaded cap to control access to the leachate head well. The surface access points of the head wells will be protected by guard posts installed outside the limits of the geomembrane/GCL liner.

3.8.7 Leachate Pipe Strength

Pipe strength calculations were performed to determine the minimum standard dimension ratio (SDR) of the HDPE leachate pipe required to withstand the expected loads and deflection. Based on the calculations, the leachate pipes have been specified as SDR 17 pipe. The pipe strength calculations are included in Appendix G.

3.9 Daily and Intermediate Cover

In accordance with NR 506.05(2) NR 506.06, high-volume industrial waste landfills, including the proposed DPC Phase IV disposal area, are not subject to daily and intermediate cover requirements, respectively. Since the waste consists almost entirely of coal ash (approximately 99 percent), the use of daily and intermediate cover soil to control odors will not be required.

Although not required, temporary intermediate cover may be used on intermediate slopes to minimize leachate generation by diverting clean surface water to the surface water management system. If temporary intermediate cover is used, it will be subsequently used as the 0.5-foot grading layer component of the final cover or for structures within the ash limits.

3.10 Final Grades

Final grades have been designed to be compatible with the surrounding topography and the anticipated final use as open green space. The final grades will consist of 4H:1V sideslopes. The final grades, in conjunction with the final cover system and surface water management system, will effectively reduce infiltration of precipitation and thus reduce the quantity of leachate generated within the landfill. The proposed final grades are shown on Plan Sheet 12.

3.11 Composite Cover System

A final cover will be constructed to bring the site to final grades, as shown on Plan Sheet 12. The final cover system has been designed to meet the requirements of NR 504. The final cover system will consist of the following layers, from the bottom to top (also refer to Detail 1 on Plan Sheet 19):

- 6-inch-thick soil grading layer
- Geosynthetic clay liner (GCL)
- 40-mil-thick very flexible polyethylene (VFPE) geomembrane liner
- 12-inch-thick granular drainage layer
- 12-inch-thick general fill rooting layer
- 6-inch-thick topsoil layer

Each of these layers is described in further detail below.

3.11.1 Grading Layer

The 6-inch-thick soil grading layer will consist of on-site general fill soil and will be placed in accordance with the CQA Plan (refer to Appendix D). During placement, clump and stone sizes within the soil will be limited to 2 inches or less. The final lift will be smooth drum-rolled, and coarse gravel or cobbles larger than 1 inch in diameter and ruts greater than 1 inch in depth will be removed from the surface prior to placement of the GCL. Refer to Subsection 4.6.2 and the CQA Plan for further discussion on the construction of the soil grading layer. Details of the cover are shown on Plan Sheet 19.

During operation of Phase IV, DPC will evaluate the ease of grading the ash and the texture of the surface that can be graded. If the ash can be graded such that an adequate surface can be prepared for GCL deployment, DPC may, in the future, request that the 6-inch-thick soil grading layer be eliminated.

3.11.2 Geosynthetic Clay Liner (GCL)

A GCL placed above the soil grading layer and in conjunction with the geomembrane, discussed in Subsection 3.11.3, will constitute the composite cover system. As allowed in NR 504.10, the GCL will be installed in lieu of the clay layer described in NR 504.07. The GCL will be installed in accordance with Subsection 4.6.3 of this report and the CQA Plan (refer to Appendix D), which was prepared in accordance with the Bureau of Waste Management's "Guidance for the Use of Geosynthetic Clay Liners (GCLs) at Solid Waste Facilities" and manufacturers' recommendations. Material specifications from some of the acceptable manufacturers are contained in Appendix E.

The GCL will consist of a layer of pure sodium bentonite clay encapsulated between two geotextiles, which will meet the minimum physical characteristics found in the CQA Plan.

3.11.3 40-mil VFPE Geomembrane Liner

A 40-mil textured VFPE geomembrane liner will be placed directly above the GCL. The geomembrane liner material and placement activities will meet the requirements of s. NR 504.07(5) and the CQA Plan (refer to Appendix D).

Textured 40-mil VFPE geomembrane will be used throughout all areas of the final cover. Design calculations for the stability of the textured 40-mil geomembrane are included in Appendix J. Based on the geotechnical calculations, textured 40-mil VFPE geomembrane will provide the physical properties necessary for a stable design.

The 40-mil VFPE geomembrane will have the minimum physical, mechanical, hydraulic, endurance, and degradation properties presented in Subsection 4.6.4 and in the CQA Plan (Appendix D). Additional testing and installation requirements are also described in Subsection 4.6.4 and in the CQA Plan.

Geomembrane panels will be placed such that seaming occurs directly down the slopes. Plan Sheet 19 shows the design of the final cover.

3.11.4 Granular Drainage Layer

A 12-inch-thick select granular fill drainage layer will be placed above the geomembrane. The select granular fill will have a minimum hydraulic conductivity of 1×10^{-3} cm/s at the anticipated placement density, in accordance with s. NR 504.07(6)(a). This material will meet the specifications presented in the CQA Plan (Appendix D) and will be obtained from a local quarry.

Surface water that enters the drainage layer will flow toward the perimeter of the landfill and will be collected in 4-inch-diameter perforated, corrugated polyethylene collection pipes located below diversion berms on the final cover as shown on Detail 2 on Plan Sheet 19 and in the perimeter berm as shown on Details 4 and 5 on Plan Sheet 19. Pipes will slope at a minimum of 1 percent with a majority at 2 percent to an outlet pipe. Pipes located below the diversion berms on the final cover will drain to the downslope flume locations and will discharge into the next lowest inlet pipe as shown on Detail 1 on Plan Sheet 20. Pipes located in trenches in the perimeter berm will follow the same slope as the top of the berm and will discharge through pipes located at 500-foot intervals around the landfill. Pipes located in areas where the top of berm is flat

will be sloped at 2 percent and will discharge through pipes spaced at 200-foot intervals as shown on Detail 4 on Plan Sheet 19. Surface water collected in the final cover collection pipes will discharge through the 4-inch-diameter nonperforated outlet pipes to the downslope flumes and to perimeter drainage ditches around the perimeter of the landfill (see Plan Sheet 12).

The final cover collection pipes will be bedded within an envelope of select aggregate fill pipe bedding material as shown on Details 2 and 4 on Plan Sheet 19. The bedding material will meet the same gradation requirements as the leachate collection line bedding material. The bedding material will be separated from fine-grained soil with a geotextile filter.

3.11.5 General Fill Rooting Layer

A 12-inch-thick uncompacted general fill rooting layer will be placed above the drainage layer. The general fill rooting layer will provide a rooting zone for vegetation, will protect the cap from damage due to freeze-thaw and desiccation, and will provide additional protection for the geomembrane. The general fill rooting layer will consist of on-site soil and will meet the requirements of the CQA Plan (Appendix D).

3.11.6 Topsoil and Vegetation

The top layer of the final cover system will be a 6-inch-thick layer of topsoil. Topsoil stripped from the landfill and perimeter areas during site preparation will be stockpiled and reused in the final cover. Samples will be obtained from each topsoil stockpile for soil fertility testing prior to placement of the final cover. Testing will consist of pH, nitrogen, phosphorus, and potassium assessment. After topsoil is placed, the area will be seeded, mulched, and fertilized, as required, based on the topsoil test results. Prior to seeding, the topsoil layer will be prepared for seeding by disking and pulverizing soil within 2 inches of the surface. Fertilizer and lime will be applied at rates specified by the nutrient analysis.

Seed will be applied at a rate of approximately 150 lb/acre. The seed mixture to be utilized is based on design recommendations included in Appendix K and consists of the following:

VARIETY	DITCHES	SLOPES
White Clover	10%	--
Tall Fescue	--	40%
Hard Fescue	--	24%
Creeping Red Fescue	25%	--
Kentucky Bluegrass	40%	6%
Redtop	5%	--

Alternatively, DPC may wish to utilize a prairie-type seed mix. If another seed mixture is used for final cover restoration, it will be preapproved by the WDNR. Mulch will consist of straw, hay, wood excelsior fiber, wood chips, or similar suitable material. Mulch will be placed to a loose depth of ½ inch to 1 ½ inches, or approximately 1.5 to 3 tons/acre. The CQA Plan in Appendix D details the material and placement requirements.

3.12 Geotechnical Analysis

The design of the proposed Phase IV disposal area takes into account the site-specific geology, hydrology, topography, and surface water drainage patterns. Specific attention and analysis have been given to global geotechnical stability and liner system interface stability. The analyses included in Appendix J were based upon site-specific information gathered for this facility. On the basis of the results of the geotechnical evaluation, the proposed Phase IV disposal area design will be stable.

3.12.1 Global Stability

A global stability analysis of the final cover and perimeter berm sideslopes is included in Appendix J. The analysis evaluated the worst-case liner sideslope in Cell 4, Module A, and the worst-case final cover slope along the southeast side of the final cover. The analyses indicate a minimum factor of safety of 1.6 has been achieved for each of these conditions. Based on these analyses, and on the performance of DPC's existing landfills, global slope stability is not a concern at this site.

3.12.2 Liner System Interface Slope Stability

Interface stability calculations were performed for the select granular fill/textured geomembrane, textured geomembrane/GCL, internal GCL, and GCL/subgrade interfaces of the liner system and final cover system. Friction angle and adhesion values used in the analyses were based on project-specific interface test results. Based on these

calculations, the critical interface for the liner system occurs between the textured geomembrane/GCL (hydrated). These calculations indicate that minimum factors of safety of 1.9 and 2.0 will be obtained for the critical liner and cover interfaces, respectively. These factors of safety are greater than the design factor of safety of 1.2 (using residual interface friction angles), indicating that the interfaces will be stable. Interface slope stability calculations are included in Appendix J.

3.13 Surface Water Management

3.13.1 Introduction

The surface water controls for the proposed Phase IV disposal area will consist of diversion berms, downslope flumes, ditching, sedimentation basins, and culverts, all designed to control surface water during both the operational and post-closure care periods of the landfill. The design of the surface water controls has been performed for the existing site conditions, for the operational periods when the combination of surface conditions and contributing acreage would result in the greatest runoff volume, and for the post-closure period. Given the location of the site, a greater factor of safety has been incorporated into the surface water management system design by utilizing a 100-year, 24-hour storm event rather than the 25-year storm required by NR 500. Calculations for the surface water control design are included in Appendix K.

Peak runoff quantities were computed using the Quick TR-55 program, which uses the TR-55 methods developed by the Soil Conservation Service for computing hydrographs. Diversion berm, ditch, and spillway sizing was performed using Manning's equation for the peak flows and proposed ditch configurations, and using erosion control design software. Sedimentation basins were designed using the Pond-2 basin routing program developed by Haestad Methods. The program routes the in-flow hydrograph from the design storm through the basin to determine the peak discharge and water stage.

The surface water design has been performed to meet the following requirements:

- Runoff curve numbers (RCNs) used in the analysis provide a conservative analysis of the potential land uses of the upland areas. Upland areas within the watershed primarily include wooded areas and agricultural lands. The wooded areas are located on the steeper-sloped areas of the valley and are unlikely to be affected by future land uses. High RCNs for the agricultural lands were selected to represent a conservative fallow condition with exposed bare soil. The RCNs selected for these areas were 86.
- Temporary and permanent storm water control structures have been designed using a 100-year, 24-hour storm event and a TR-55 Type II storm distribution to

determine peak flow rates. Rainfall distributions for the Type II storm event include "nested" higher intensity storm events within those needed for longer durations at the same probability. The resulting peak flows using this design method exceed the peak flows obtained using a 100-year time-of-concentration storm event.

- Sedimentation basins have been designed with a minimum surface area that exceeds the required surface area to settle 0.015 mm particles for all storm events up to, and including, the 100-year, 24-hour storm. Sedimentation basins have been designed to handle a 100-year, 24-hour storm event. Emergency spillways have been included to handle storms greater than the 100-year, 24-hour storm event. Both sedimentation basins have been designed to dewater in no less than 3 days following a 25-year, 24-hour storm event.
- Surface water controls have been designed to divert off-site surface water away from active fill and borrow areas. All on-site surface water will be routed to sedimentation basins, except surface water in contact with active fill areas, which will be treated as leachate. Impacts to adjacent properties will therefore be minimized.
- Information related to the recommended vegetation types for newly graded areas is included in Appendix K. Vegetation types for the design were selected based on their ability to withstand erosion in addition to their suitability for the site location and function.

3.13.2 Control of Surrounding Surface Water Run-on

Surface water from areas west, north, and east of the proposed landfill currently drain to existing drainage channels that have formed in the valleys at the site. These drainage channels converge at the location of the proposed landfill and continue to the south in a single drainage ditch. The main drainage ditch then routes the water to the south for approximately 1.5 miles before discharging into the Mississippi River (see Plan Sheet 5). For the post-development conditions, all surface water runoff will continue to be routed to the main drainage ditch. These drainage patterns are shown on Figure K-1 in Appendix K.

Diversion ditches have been designed to route off-site surface water around the landfill in a controlled manner. These ditches will be constructed in phases as the landfill is developed.

During Cell 1 development, the perimeter drainage ditch on the eastern side of the landfill will be constructed from the main channel south of the landfill to a location near Benchmark BM101 (see Plan Sheet 6). This ditch will route surface water from areas east and northeast of the landfill around the landfill. In addition, a temporary drainage ditch/diversion berm will be constructed on the western side of Cell 1 to route surface

water from areas north and west of the landfill around the landfill. During Cell 2, Module B development, the perimeter ditch on the eastern side of the landfill will be extended to the northern limit of the landfill to pick up surface water coming from the north. Also, the temporary drainage ditch/diversion berm on the western side of Cell 1 will be relocated further to the west to allow construction of Cell 2, Module B. During Cell 3 development, the perimeter drainage ditch on the western side of the landfill will be constructed from the main channel south of the landfill to a location near 171,800N (see Plan Sheet 9). This ditch will route surface water from areas west of the landfill around the landfill. In addition, a temporary drainage ditch/diversion berm will be constructed on the northwestern side of the landfill to route surface water from areas northwest of the landfill around the landfill. During Cell 4, Module B development, all surface water controls will be completed. Throughout the landfill's construction and operational sequencing, existing vegetation will be preserved whenever feasible to minimize erosion.

All temporary and permanent ditching and diversion berms have been designed to handle the peak flows associated with the 100-year, 24-hour storm event. These ditches in many cases will actually be wider than the existing drainage channels. In addition, they will be designed to handle the design flow velocity and will be lined as appropriate (e.g., grass, erosion matting, or riprap) to minimize the potential for erosion. These improvements are expected to improve the water quality of the runoff leaving the site.

3.13.3 Diversion Berms

Diversion berms are designed along the final cover system to collect and transfer surface water to the receiving downslope flume or sedimentation basin (see Detail 2 on Plan Sheet 19). These diversion berms concentrate and control flow, and discharge the surface water from the landfill more quickly. The swales created by the diversion berms have been designed at 2 percent typical slopes along the flow lines. The proposed locations of the surface water diversion berms are shown on Plan Sheet 12.

Drainage areas for the landfill are defined by the proposed surface water diversion berms at the site. Runoff computations were performed for the site with the proposed diversion berms in-place and are contained in Appendix K. Figure K-2 in Appendix K shows the post-closure drainage areas for the proposed DPC Phase IV disposal area.

3.13.4 Downslope Flumes

Downslope flumes have been included in the design to collect and transfer surface water from the diversion berms on the final cover of the landfill to the sedimentation basin.

Plan Sheet 12 shows the location of the downslope flumes. The downslope flumes have been designed as enclosed pipe flumes to limit erosion and to control the flow as it crosses roads. Downslope flume calculations are included in the culvert design subsection of Appendix K. Details of the downslope flumes are included on Plan Sheet 21. The downslope flumes terminate in an energy dissipator in Sedimentation Basin 1. Detail 3 on Plan Sheet 21 depicts the energy dissipator.

3.13.5 Ditching

Surface water ditching has been designed to minimize velocities and depths of flow. Velocities for the grass-lined ditching have been limited to 4 feet per second (fps). In areas where velocities exceed 4 fps, permanent erosion matting, or grouted riprap are proposed to limit erosion and reduce velocities. Ditch sizing calculations are contained in Appendix K. Proposed ditch locations are shown on Figure K-3 in Appendix K.

3.13.6 Sedimentation Basins

Two permanent and one temporary sedimentation basins are proposed to handle runoff from the proposed DPC Phase IV disposal area. The locations of the proposed sedimentation basins are shown on Plan Sheets 7 to 12. The basins have been designed with a minimum surface area that exceeds the surface area required to settle 0.015 mm particles for all storm events up to, and including, the 100-year, 24-hour storm. The sedimentation basins have also been designed to dewater in no less than 3 days following a 25-year, 24-hour storm. The sedimentation basins have been designed to handle the surface water runoff from a 100-year, 24-hour storm event. The emergency spillways have also been included to handle the surface runoff from a storm greater than the 100-year, 24-hour storm event. Calculations of the performance of the sedimentation basins are contained in Appendix K.

3.13.7 Culverts

Several culverts are proposed to handle runoff from the Phase IV disposal area and surrounding areas. The locations of the culverts are shown on Plan Sheets 6 to 12. The culverts have been designed to allow the peak runoff associated with a 100-year, 24-hour storm to pass through it without creating surface water breaching (i.e., berm overflow) or excessive backwater levels. Culvert sizing was performed using design charts developed by the U.S. Department of Transportation Federal Highway Administration. Culvert sizing calculations are included in Appendix K.

3.13.8 Temporary Surface Water Controls

In addition to the permanent surface water management features discussed above, temporary surface water controls will also be implemented during operation of the landfill to control surface water runoff from entering the active disposal area (where it would then be treated as leachate) and to limit erosion of the final cover. These temporary control features include diversion berms, downslope discharge structure, and culverts. Temporary diversion berms will be constructed as needed along the transition from an active area to an area that has reached final grade, or that has intermediate cover, in order to control surface water runoff from entering the active area. A temporary downslope discharge structure may also be used to route surface water runoff from diversion berms (either temporary or permanent) to the perimeter ditches.

3.13.9 Predevelopment Versus Post-Development Surface Water Flows

The proposed site development will not significantly alter the surface water discharge and runoff to the main drainage channel, and will exceed the requirements of NR 504.09. A comparison of total runoff and peak flow rates to the main drainage ditch from a 100-year, 24-hour storm for predevelopment and post-development conditions is presented below:

- Predevelopment
 - Total runoff (includes on-site and off-site areas - Figure K-1 in Appendix K) = 232 acre-feet
 - Peak flow rate = 1,895 cfs
- Post-development
 - Total runoff (includes on-site and off-site areas - Figures K-2 and K-3 in Appendix K) = 225 acre-foot
 - Peak flow rate = 1,622 cfs

From pre- to post-development, there was a slight decrease in the total runoff volume, and the peak flow rate to the main drainage ditch decreased by approximately 15 percent (273 cfs). This change is due primarily to the dampening effect of the sedimentation basins.

3.14 Gas Management System

NR 504.08 requires that facilities which accept waste with the potential to generate gas be designed to prevent the migration of explosive gases generated by the waste fill. The ash disposed at this site is biologically inert; thus, a gas management and monitoring system has not been included in the design in accordance with the Feasibility Determination.

3.15 Air Emission Permitting

On September 19, 2000, DPC submitted a request for exemption from construction permit and air monitoring requirements for the Phase IV disposal area (see Appendix A). On September 19, 2000, the WDNR West Central Region Air Management Program responded with a letter indicating that the proposed Phase IV disposal area has been determined to be exempt from construction permit requirements in accordance with NR 406.04(4)(h) (see Appendix A). In addition, air monitoring has been determined to not be necessary at this time.

3.16 Site Phasing

The site will be developed and operated in cells. The layout of cells is shown on Plan Sheet 4 (Subbase Grades). Cell 1 is located in the northeastern end of the site, with each cell thereafter proceeding to the west and south.

Filling will begin in Cell 1, progress to Cell 2 (Modules A and B), and continue sequentially through Cell 4, Module B. This cell-by-cell design will allow for the seasonal construction required for landfills.

As illustrated on Plan Sheets 6 through 11, liners, leachate collection systems, perimeter berms, and surface water drainage features will be constructed prior to the development of each successive cell to minimize erosion. As also shown on those phasing drawings, as major portions of final cover slopes reach final grades, the final cover system for those areas will be constructed and vegetated. Depending on when final grades are reached, final cover construction may not occur until the following construction season.

After waste placement in Cell 4, Module B is completed, the remainder of the final cover system will be constructed, and remaining portions of the access road and the drainage structures will be completed. See Plan Sheet 12 for the entire landfill final cover grades. Tables contained in Appendix C summarize the material quantities for each cell.

Section 4

Site Construction

4.1 General

This section addresses various considerations regarding landfill site construction beyond those already discussed in Section 3. Included is information on the major design considerations during construction, the limitations to construction due to weather conditions, the horizontal and vertical control that will be maintained during construction, the phasing and timing of construction, and the documentation that will be performed during construction and subsequently submitted to the WDNR for review and approval prior to ash placement.

Personnel responsible for the construction should also be familiar with the contents of Section 3, which presents information on the logic used in preparing the design elements and the major objectives to be accomplished during construction.

4.2 Construction Procedures

Construction of the Phase IV ash disposal facility will occur in four cells. Construction of Cell 1 is planned to start in April 2001 and be completed in September 2001. Construction of Cells 2, Modules A and B, 3, and 4, Modules A and B is expected to occur sequentially, subject to actual ash disposal rates.

The construction procedures addressed in this section are presented to guide construction personnel in the development and closure of the site, although the actual site construction means and methods will be the responsibility of the construction contractor. The main work elements for site construction include site preparation, subbase excavation, abandonment and replacement of several monitoring wells, groundwater monitoring and installation of a new water supply well, composite liner system construction, leachate collection system installation, leachate head well installation, surface water drainage control, access and maintenance road construction, and final cover construction. Construction documentation and testing procedures and frequencies for earthen and synthetic materials will meet the requirements of NR 516 and the CQA Plan (Appendix D).

Erosion control features to minimize sediment runoff will be implemented prior to earthwork as discussed in Subsection 4.9.

4.3 Well Abandonment and Construction

Monitoring wells W42, P42A, W42B, W102, and W102A will be replaced with wells W42R, W42AR, W102R, and W102AR prior to ash disposal in Phase IV. In addition, wells Station 1, Station 2, and W43 will be abandoned during Cell 1 construction (refer to Plan Sheet 13). The existing high capacity well (PW1) will be abandoned, and a new high-capacity well will be installed at (or near) 168470N, 1476700E (Plan Sheet 3). This location is over 1,200 feet from all past, current, and proposed ash disposal units at the site. Bumper posts, or equivalent, will be utilized (as needed) to protect monitoring wells during landfill construction activities. A separate submittal will be forwarded to the WDNR Drinking Water Section to obtain approval for the new high-capacity well.

4.4 Subbase Grade Establishment

Subbase grades will be established as shown on Plan Sheet 4. Material excavated will be used for the construction of surface water control features, perimeter berms, access roads, subbase grades, liner construction, or other site development features. Excess material will be stockpiled for use in liner construction, final cover construction, berm and road construction, other on-site construction projects, and site operations. Stockpile locations are shown on Plan Sheets 6 through 11. Separate stockpiles will be created for the topsoil, general fill, and low-permeability layer material. These stockpiles will include surface water and erosion control features as described in Subsection 4.5. Material quantity estimates for the subbase excavation are included in Tables 2 and 3 in Appendix C, and are based on the grades shown on Plan Sheets 6 through 11.

Subbase grade preparation will consist of clearing and grubbing, stripping and stockpiling of low-permeability layer (loess) material, general fill, and topsoil; excavating and using or stockpiling material to achieve subbase grades; testing soil as required; undercutting leachate collection system lines; finish-grading; and documenting grades. Excavation will be controlled during construction through the use of grade staking and verification surveys. Subbase grades will be surveyed on a maximum 50-foot grid, and leachate collection trench undercut grades will be surveyed every 25 linear feet, or every 50 linear feet if a total station or laser equipment is used to set elevations, in accordance with Chapter NR 516.05(1)(a).

During subbase excavation, surface water drainage will be controlled through the use of temporary ditching, diversion berms, sedimentation basins, and erosion control measures. Surface water controls will be established in both the cell being constructed and in the area of material stockpiling. Additional information on surface water management during construction is presented in Subsection 4.9.

4.5 Stockpiles

Stockpiles will be created during the construction of each of the four cells. The proposed stockpile locations are shown on Plan Sheets 6 through 11. During excavation activities, care will be taken to identify the different types of material encountered, and to separate these materials during stockpiling. Separate areas of the stockpiles will be created for the topsoil, low-permeability layer material, and general fill. The material that is excavated and/or stockpiled will be used for liner, berm, final cover, and other miscellaneous construction. Upon completion of soil stockpiling activities, stockpile surfaces will be vegetated.

Erosion control measures for the stockpile areas will be implemented. The erosion control measures will include berms, ditching, hay bales, and the seeding of the stockpiles and of the area surrounding the stockpiles that will remain undisturbed for an extended period. Refer to Detail 2 on Plan Sheet 23 for a detail illustrating erosion control measures at the stockpiles.

4.6 Composite Liner and Cover System

4.6.1 Low-permeability Layer

The low-permeability layer to be used for the liner construction will be obtained from the on-site excavations for subbase preparation. Appendix C includes material balance calculations for the loess material to be used for the low-permeability layer. Low-permeability layer material (base and sidewalls) will meet the specifications provided in the CQA Plan (Appendix D), and will be placed and compacted to a density that is at least 90 percent of the maximum dry density as determined by the Modified Proctor test method. The CQA Plan also includes a discussion of procedures to segregate acceptable materials for use as the low-permeability layer. This material will be placed and compacted to achieve a hydraulic conductivity of 1×10^{-5} cm/s or less. The soil will have a minimum thickness of 2 feet measured vertically from the liner surface. The thickness will be documented by surveys performed on the same 50-foot grid used to document subbase grades. Compaction will be achieved by use of a sheepsfoot compactor, with a minimum static weight of 30,000 pounds, or an equivalent piece of equipment.

During placement of the low-permeability layer, the maximum allowable clump size and stone size will be 2 inches in diameter. The final lift of the layer will be smooth drum-rolled, and coarse gravel or cobbles larger than 1 inch in diameter will be removed. In addition, areas with ruts greater than 1 inch in depth will be reworked to remove the ruts.

The soil will be tested both in the field (to document compaction) and in the laboratory (to document hydraulic conductivity and material properties) in accordance with s. NR 504.06. Samples of the soil will be obtained both prior to, and after, placement. Additional information on the field and laboratory testing requirements is presented in the CQA Plan in Appendix D.

The low-permeability layer material obtained may require moisture-conditioning prior to compaction. Soil that contains excessive moisture will be spread and disked, if necessary, and allowed to dry prior to compaction. Soil that is dry of the specified moisture content range will be moisture-conditioned with water prior to compaction. Areas of the liner that have dried out prior to placement of the subsequent lift of soil will be scarified and moisture-conditioned prior to the placement of the next lift.

During phased construction of the liner, the low-permeability layer will be extended beyond the cell line. This portion of the liner will be used for splicing together the liner systems of adjacent cells (see Detail 5 on Plan Sheet 17).

4.6.2 Grading Layer

The 6-inch-thick grading layer to be used for final cover construction will consist of general fill soil and will be obtained from the on-site excavations for subbase preparation. The grading layer material will meet the specifications provided in the CQA Plan (Appendix D). This soil will have a minimum thickness of 6 inches measured vertically from the cover surface. The thickness will be documented by surveys performed on the same 100-foot grid that will be used to document the subsequent final cover components (50-foot grid for areas less than 4 acres), in accordance with Chapter NR 516.06(1)(a).

During placement of the grading layer, the maximum allowable clump size and stone size will be 2 inches in diameter. The surface of the grading layer will be smooth drum-rolled and coarse gravel or cobbles larger than 1 inch in diameter will be removed. In addition, areas with ruts greater than 1 inch in depth will be reworked to remove the ruts. Refer to Details 1 and 3 on Plan Sheet 19 for illustrations of the final cover layers and a final cover splice, respectively.

During operation of Phase IV, DPC will evaluate the ease of grading the ash and the texture of the surface that can be graded. If the ash can be graded such that an adequate surface can be prepared for GCL deployment, DPC may, in the future, request that the 6-inch-thick soil grading layer be eliminated.

4.6.3 Geosynthetic Clay Liner

The installation of the GCL will begin following the approval of the low-permeability layer. Detailed specifications for the materials, installation, testing, and documentation of the GCL are contained in the CQA Plan (Appendix D); however, this subsection provides a brief overview of those items. As described in Subsection 4.12, a preconstruction report will be submitted to the WDNR a minimum of 15 days prior to a preconstruction meeting for the installation of the geosynthetic portions of the liner or cover for each cell.

The GCL will consist of a layer of pure sodium bentonite encapsulated between two geotextiles that will provide a low-permeability barrier layer. The GCL will be placed such that the side recommended by the manufacturer is facing up. The GCL will be orientated parallel (i.e., running up and down the slope) to the slopes that are in excess of 10 percent. Due to the manufactured roll length (150 feet), end seams will be necessary; however, the number of end seams on slopes greater than 10H:1V will be minimized and will not be deployed within 25 feet up- or down-slope of another end seam on an adjacent panel.

The GCL will be deployed such that there is a 6-inch minimum overlap on longitudinal seams and a 24-inch overlap on end seams or as recommended by the manufacturer, whichever is greater. The panels will be placed with the overlap on both longitudinal and end seams shingled down-slope. If the GCL requires granular bentonite to be placed along the seam, the overlapping panel edge will be pulled back and granular sodium bentonite will be poured continuously along all seams, at an application rate of $\frac{1}{4}$ pound per linear foot.

Anchor trenches will be constructed at the top of the slope of the liner to secure the GCL during installation (Detail 3 on Plan Sheet 17). In addition, sandbags will be deployed as needed, along the edge of the GCL to prevent the GCL from shifting due to high winds or for other construction-related reasons.

The GCL will be tested during manufacturing, and prior to installation. The results of manufacturer's testing will be submitted for review and approval prior to the acceptance of GCL rolls delivered to the site. Samples from selected rolls delivered to the site will also be collected for conformance testing to be completed by a third-party laboratory prior to acceptance and installation. No field testing of the GCL will be performed. The testing requirements, acceptable values, and responsibilities are further explained in the CQA Plan (Appendix D).

The installation of the GCL will be performed in accordance with s. NR 516, the "Guidance for the Use of Geosynthetic Clay Liners (GCLs) at Solid Waste Facilities, and the CQA Plan (Appendix D).

4.6.4 HDPE and VFPE Geomembrane

The HDPE and the VFPE geomembrane will be deployed at a rate equivalent to that of the GCL deployment rate such that the GCL panels will be covered daily to prevent against physical damage and/or hydration of the GCL. Detailed specifications for the materials, installation, testing, and documentation of the geomembrane are contained in the CQA Plan (Appendix D); however, this subsection provides a brief overview of those items. As described in Subsection 4.12, a preconstruction report will be submitted to the WDNR a minimum of 15 days prior to a preconstruction meeting for the installation of the geosynthetic portions of the liner or cover for each cell.

The geomembrane will be fabricated from a polyethylene resin, which will have a density range of 0.940 g/cc or higher for HDPE and 0.939 g/cc or less for VFPE. The nominal geomembrane thickness will be 60 mils for HDPE and 40 mils for VFPE, with no thickness measurements falling below the minimum industry-accepted manufacturing tolerance. In addition, the geomembrane will have a melt index value, per ASTM D1238, of less than 1.0 g/10 minutes for HDPE and 0.6 g/minutes for VFPE. The resin will be virgin material with no more than 10 percent rework, and if rework is used, it must be of the same formulation as the parent material. No post-consumer resin (PCR) of any type will be added to the formulation.

The geomembrane will be installed with the panels orientated perpendicular to the contours (i.e., running up and down the slope) on slopes in excess of 10H:1V. No horizontal seams will be allowed on slopes greater than 5H:1V. In corners and at other odd-shaped geometric intersections, the number of horizontal seams will be minimized.

The geomembrane will be deployed over the GCL using different techniques, dictated based on if the geomembrane is smooth or textured. On the shallower slopes, where smooth geomembrane is to be deployed, the geomembrane may be installed by pulling the geomembrane out to the desired length using laborers or small four-wheel-drive all-terrain vehicles (ATVs), either directly over the GCL or an adjacent panel. If pulled out over an adjacent panel, laborers will then pull the geomembrane sideways across the GCL into place. Alternative deployment methods may be proposed during the preconstruction meeting.

On steeper slopes, where textured geomembrane is to be deployed, a "rub sheet" made of thin plastic will be used to protect the GCL from damage when the geomembrane is pulled across the GCL. The method used to deploy the textured geomembrane may be similar to the two methods discussed for smooth geomembrane once the "rub sheet" is in place, or the installer may propose an alternative method during the preconstruction meeting.

Production seaming (linear seams) will be performed using the dual hot wedge (fusion type) seam method. Non-production seams (detail work and repairs) will be performed using the extrusion fillet weld process. Corners, butt seams, and long repairs will be fusion-welded where possible. The geomembrane component of the adjacent cell will be welded together for a continuous membrane surface.

Anchor trenches will be constructed at the top of the slope of the liner to secure the geomembrane during installation (Detail 3 on Plan Sheet 17). In addition, sandbags will be deployed as needed, along the edge of the geomembrane to prevent the geomembrane from shifting due to high winds or for other construction-related reasons. The geomembrane will be seamed completely to the end of the panels to minimize the potential for tears to start along the seams placed in the anchor trench.

The geomembrane will be tested during manufacturing, and prior to and during installation. The results of the manufacturer's testing will be submitted for review and approval prior to the acceptance of geomembrane rolls delivered to the site. Samples from selected rolls delivered to the site will also be collected for conformance testing by a third-party laboratory prior to acceptance and installation. Finally, during placement, both nondestructive and destructive testing of the geomembrane seams will be performed. Nondestructive testing will be performed by the installation contractor and observed by a third party. Destructive testing will consist of both field and third-party laboratory testing of the samples collected. The testing requirements, acceptable values, and responsibilities are further explained in the CQA Plan.

The geomembrane installation will be documented in accordance with s. NR 516 and the CQA Plan (Appendix D). In addition, following the installation of the select granular fill drainage layer material over the geomembrane liner, electrical resistivity testing will be conducted over the entire lined area. Detected defects will be uncovered and repaired in accordance with industry standards and manufacturer's recommendations.

4.6.5 Granular Drainage Layer

After placement and testing of the geomembrane, or portions thereof, a 12-inch-thick select granular fill drainage layer will be placed as soon as practicable to protect the geomembrane and to provide a confining pressure for the underlying GCL. DPC will make every effort to have the entire membrane covered with the drainage layer as soon as possible. At a minimum, the select granular fill will be placed within 30 days of completing the membrane installation and quality assurance testing. The select granular fill drainage layer is part of the leachate collection system and drainage layer for the final cover, which is further described in Subsections 3.8.3 and 3.11.4.

To minimize the potential for large wrinkles in the geomembrane, the drainage layer will be placed during cooler temperatures when possible. Wrinkles in the geomembrane that are higher than they are wide, will be smoothed or cut out and repaired prior to placing the drainage layer.

The initial lift of select granular fill will be 2 to 3 feet thick, depending on the type of equipment being used, to provide an access ramp into the cell. A minimum of 2 feet of material will be placed prior to operating tracked vehicles and flotation tire-equipped vehicles, while a minimum of 3 feet of material will be placed prior to operating trucks and other wheeled hauling equipment. The initial lifts of select granular fill will eventually be graded to the designed 1-foot-thick layer with a low ground pressure (< 5 psi) tracked vehicle. The procedure for deployment of the granular drainage blanket will be established at the preconstruction meeting.

4.6.6 Geotextile

A minimum 12 ounce/square yard geotextile cushion will be installed above the geomembrane in the leachate collection trenches to protect the geomembrane from damage from the leachate collection pipe bedding material, as well as to protect the geomembrane from ultraviolet (UV) degradation (refer to Detail 1 on Plan Sheet 17). A minimum 12 ounce/square yard geotextile cushion will be included over the entire liner area if the select granular fill material exceeds ¼ inch in size, in accordance with NR 504.06(5)(t).

4.6.7 General Fill Rooting Layer

A 12-inch-thick uncompacted general fill rooting layer will be placed above the drainage layer in a single lift. The general fill rooting layer will provide a rooting zone for vegetation, and will protect the cap from damage due to freeze-thaw and desiccation.

The general fill rooting layer will consist of on-site soil and will meet the requirements of the CQA Plan (Appendix D).

4.6.8 Topsoil and Vegetation

The top layer of the final cover system will be a 6-inch-thick layer of topsoil in accordance with NR 504.07(7). Topsoil stripped from the landfill and perimeter areas during site preparation will be stockpiled and reused in the final cover. Samples will be obtained from each topsoil stockpile for soil fertility testing prior to placement of final cover. Testing will consist of pH, nitrogen, phosphorus, and potassium assessment. After topsoil is placed, the area will be seeded, mulched, and fertilized, as required, based on the topsoil test results in accordance with NR 504.07(8). Prior to seeding, the topsoil layer will be prepared for seeding by disking and pulverizing soil within 2 inches of the surface. Fertilizer and lime will be applied at rates specified by the nutrient analysis.

The seed mixture and related information is described in Subsection 3.11.6. Seed will be applied at a rate of approximately 150 lb/acre.

4.7 Leachate Collection System

The leachate collection system will consist of perforated collection piping, cleanout risers, nonperforated double-walled transfer piping, leachate transfer manholes, a leachate collection tank, and leachate head wells. In addition, a 12-inch-thick layer of select granular fill will be placed on the entire base and the sidewalls of the landfill to convey leachate to the collection pipes (Subsection 4.6.5).

4.7.1 Leachate Collection Pipes

The leachate collection pipes will consist of perforated 6-inch-diameter SDR 17 HDPE pipes placed in vee-trenches as shown on Detail 1 on Plan Sheet 17. Collection trench elevations will be documented with surveys performed every 25 linear feet, or every 50 linear feet if a total station or laser equipment is used to set elevations, as specified in Chapter NR 516.05(1)(a). A minimum of 4 and 12 inches of select aggregate fill (pipe bedding material) will be placed below and above the pipes, respectively. The pipe bedding material will conform to the requirements of NR 504.06(5)(e) and the CQA Plan (see Appendix D). A 6-inch-thick layer of select graded fill will be placed over the pipe bedding material, if needed for filtering the select aggregate fill. Pipe joints will be butt-fusion-welded in accordance with the manufacturer's recommendations. The leachate collection piping will be flushed after construction, and the appropriate documentation will be submitted to the WDNR.

4.7.2 Cleanout Risers

Leachate collection piping will be connected to cleanout risers to allow access to the collection pipes. The cleanout risers will consist of nonperforated 6-inch-diameter SDR 17 HDPE pipe. Cleanout risers will be constructed inside manholes as shown on Detail 2 on Plan Sheet 18 and up the sidewalls as shown on Detail 6 of Plan Sheet 17. Twenty-four inches of granular drainage blanket material will be mounded over the cleanouts on the sideslopes. The cleanout risers will include a locking cap at the termination in the manholes and at the top of the sideslope.

4.7.3 Leachate Transfer Piping

Leachate will be transferred via gravity from the interior leachate collection piping system to the leachate storage tank through a double-walled HDPE transfer piping system. The transfer piping will penetrate the landfill liner as described in Subsection 3.8.4, and as shown on Details 2 and 4 on Plan Sheet 17. The transfer piping will be routed through a series of leachate transfer manholes (see Subsection 4.7.4, Plan Sheet 5, and Detail 2 on Plan Sheet 18).

The double-walled leachate transfer piping will consist of nonperforated 6-inch-diameter SDR 17 HDPE pipe encased in nonperforated 8-inch-diameter SDR 17 HDPE pipe and will be constructed in a trench as shown on Detail 3 on Plan Sheet 23. The transfer piping will be installed a minimum of 4 feet below final grade for frost protection. The HDPE forcemain piping will be joined using the butt-fusion-welding process in accordance with the pipe manufacturer's recommendations. The entire length of the transfer line and the containment pipe will be pressure-tested in accordance with the CQA Plan (Appendix D) to document the pipe welds. Additional information on the piping is included in Appendix E.

4.7.4 Leachate Transfer Manholes

Leachate transfer manholes will be placed just south of each cell and at a junction point between the landfill and the leachate storage tank. The leachate transfer manholes will be 4-foot-diameter precast concrete manholes with epoxy coating on the interior to provide the secondary containment for the pipes in the manhole. Transfer manhole locations and details are shown on Plan Sheets 5 and 18, respectively.

4.7.5 Leachate Storage Tank

Leachate will flow by gravity to the underground storage tank through double-walled SDR 17 HDPE transfer piping. The storage tank will consist of a 30,000-gallon double-walled STI-P3 cathodically protected steel-reinforced tank, as shown on Detail 1 on Plan

Sheet 18. The interior of the tank will be coated with epoxy or another liner material compatible with the leachate. The tank will be installed per the manufacturer's recommendations (refer to Appendix E for representative tank information). The tank will be anchored with concrete deadmen and tie-down straps and backfilled with select granular fill.

4.8 Leachate Head Well Installation

Once the geomembrane component of the composite liner system has been installed, the 3-inch-diameter Schedule 120 PVC leachate head wells will be installed (see Detail 6 on Plan Sheet 17). Two leachate head wells will be installed for each cell (see Plan Sheets 5 and 13 for locations). The head wells will be placed over the geomembrane/GCL liner, within the select granular fill drainage layer. General fill will be mounded around the head well piping at the termination at the top of the berm for support. During final cover construction, the mounded general fill will be replaced with final cover material.

4.9 Surface Water Control Features

Surface water controls will be constructed during each stage of landfill development to control rainfall runoff and limit the amount of sediment discharge off-site. Subsections 3.13.2 and 3.13.8 discuss the sequencing of storm water control features and temporary storm water controls.

During site construction, ditching will be used to divert surface water away from the construction areas to the maximum extent possible. Silt fencing will also be utilized to control erosion. In areas where soil is stockpiled, diversion berms/ditches and hay bale outlet structures will be installed to intercept the sediment in the surface water runoff. Refer to Plan Sheets 6 through 11 and Detail 2 on Plan Sheet 23 for stockpile erosion control features.

Additional erosion control measures will be taken as needed to control surface water drainage and erosion. Ditch checks consisting of silt fence or hay bales will be installed in drainage ditches to control erosion until vegetation is established. Exposed soil areas outside of the limits of landfill operations and stockpiles that will remain undisturbed for more than 6 months will be vegetated to minimize erosion. Refer to Detail 1 on Plan Sheet 23 for a sediment control fence detail.

The surface water control system will be inspected after each rainfall event during construction. When problems are identified, repairs will be made as soon as possible to restore the system to proper operating condition. Further details of the site-specific Storm Water Pollution Prevention Plan are included in Appendix L.

4.10 Access Roads and Maintenance Roads

The main access road into the facility is an existing bituminous access road that extends from U.S. Highway 35 to the ash processing area. Refer to Plan Sheets 3 and 5 for layout of the existing and proposed access roads.

The main access road to the Phase IV area is an 18-foot-wide all-weather access road that connects to the existing bituminous access road near the processing facility. During each cell development, new access roads will be constructed (see Plan Sheets 6 through 11). The all-weather access roads will be constructed as shown on Detail 6 on Plan Sheet 23. The turning radii of the various vehicles anticipated to use the main access road have been incorporated into the design. Access roads used by highway vehicles will be constructed to grades not to exceed 10 percent slope.

Maintenance roads will provide access to the perimeter berms for maintenance work and pipe cleaning. Refer to Plan Sheets 6 through 10 and Detail 5 on Plan Sheet 23.

4.11 Sequential Site Construction

4.11.1 General

The Phase IV disposal facility is divided into four cells. The phasing design presented in this Plan of Operation took into consideration ash disposal rates, leachate management, design capacity, access roads, and surface water management.

4.11.2 Individual Cells

Sequential site preparation, construction, and closure activities are listed on the phasing drawings (Plan Sheets 6 through 11). The phasing drawings also indicate where connections and cell-specific features are to be constructed throughout the phased development of the landfill.

A detailed discussion of sedimentation control measures to be implemented during construction activities is included in Subsection 4.9. The respective phasing drawings illustrate the erosion control features to be implemented, at a minimum. Silt fencing will be maintained or replaced, as needed, until it is no longer needed. After construction activities are completed and vegetation is established, silt fencing will be removed.

4.11.3 Site Closure

Site closure will consist of placing the final cover system components, and establishing vegetation. The site will be closed in increments as substantial areas reach final grades.

Placement of the final cover system components will include construction of surface water drainage structures. The phased closure of the landfill will reduce leachate generation rates. See Plan Sheets 6 through 12 for a listing of closure activities for each of the cells.

Although not required (see Subsection 3.9), intermediate cover consisting of on-site soil may be placed over areas that have received ash and that will remain inactive. Temporary intermediate cover may be used on intermediate slopes to minimize leachate generation by diverting clean surface water to surface water management system. If temporary intermediate cover is used, it will be subsequently used as the 6-inch grading layer component of the final cover system or for structures within the ash limits. Areas that received temporary intermediate cover and that will remain inactive for a period of 6 months or longer over a growing season will be vegetated.

4.11.4 Quantities and Timing

The quantities associated with each cell of construction are tabulated on each of the phasing drawings (Plan Sheets 6 through 12) and are summarized in Appendix C. Quantities are included for excavation, topsoil, low-permeability layer, geomembrane/GCL, geotextile, select granular fill material, general fill, and final cover. Also indicated are the design capacity and approximate time span over which ash disposal is projected for each cell.

The approximate life indicated for each cell is based on estimated average ash filling rates. The actual site life of each cell may vary depending on market conditions for power generation and beneficial use.

Adverse weather conditions could restrict construction progress during any construction season. Construction of areas for future ash disposal will therefore occur sufficiently in advance of the time when additional airspace will be needed to allow ample time to complete construction and receive approval.

4.11.5 Phased Sequencing of Soil Volumes

Throughout the development of the proposed landfill, there will be a need to handle large quantities of soil. Site preparation for each cell will include both excavation and soil placement for berm and liner construction. Upon completion of ash filling in an area, placement of the proposed final cover will require handling of soil materials. Soil quantities for each cell of development are summarized in Appendix C.

4.12 Preconstruction Report

In accordance with s. NR 516.04(5), a preconstruction report will be submitted to the WDNR, a minimum of 15 days prior to the preconstruction meeting for the installation of the geosynthetic portions of the liner or cover for each cell. The submittal will address the requirements of s. NR 516.04(5), including but not limited to, the following:

- The name of the manufacturer and contractor selected to supply and install the geosynthetics components and their respective experience
- The name of the third-party testing laboratory
- A copy of the technical specification for the geosynthetic components and their installation
- The results of the shear testing performed on the geosynthetics and the material with which they are in contact
- The most recent version of the Construction Quality Assurance (CQA) and Construction Quality Control (CQC) Plans
- Panel layouts for the geosynthetics to be used
- Information regarding the manufacturer's quality control, including certification from the GCL manufacture that the GCL is free of needles if the material is needle punched
- The identification and justification for proposed changes to the information presented in the POO

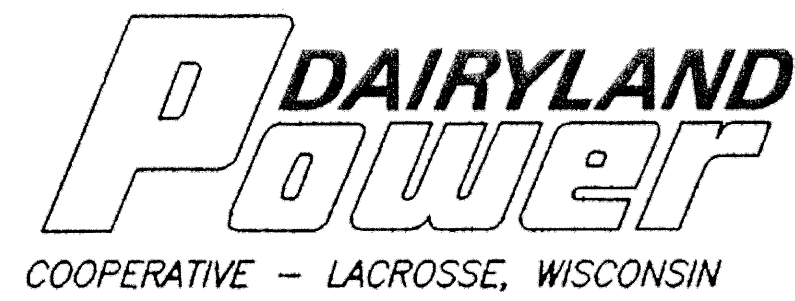
4.13 Construction Observation and Documentation

The construction and closure of the landfill will be documented under the direct supervision of a professional engineer registered in the State of Wisconsin, in accordance with s. NR 516.04. In addition, a registered professional engineer or a qualified technician under the direct supervision of a registered professional engineer will be present at all times during critical construction periods, such as liner and final cover placement, leachate collection system construction, leachate transfer and storage system construction, and granular drainage layer placement.

Reports documenting new cells and closure of cells (construction observation reports) will be prepared in accordance with NR 516.05 and NR 516.06, respectively. Additional site-specific details regarding construction observation and documentation are provided in the CQA Plan (see Appendix D).

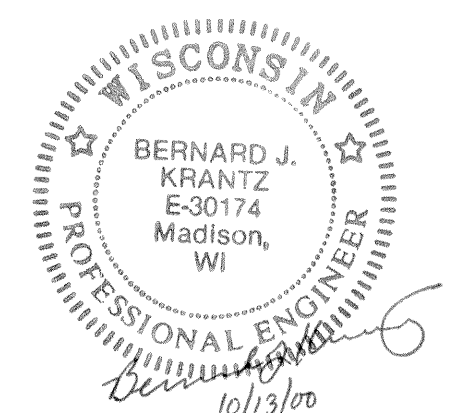
Three copies of each construction observation report will be submitted to the WDNR Bureau of Solid and Hazardous Waste Management (in Madison, Wisconsin), and two copies will be submitted to the District Office (in LaCrosse, Wisconsin).

F.2
Plan of Operation Plan Set



DAIRYLAND POWER COOPERATIVE

PLAN OF OPERATION PHASE IV DISPOSAL AREA ALMA OFF-SITE ASH DISPOSAL FACILITY



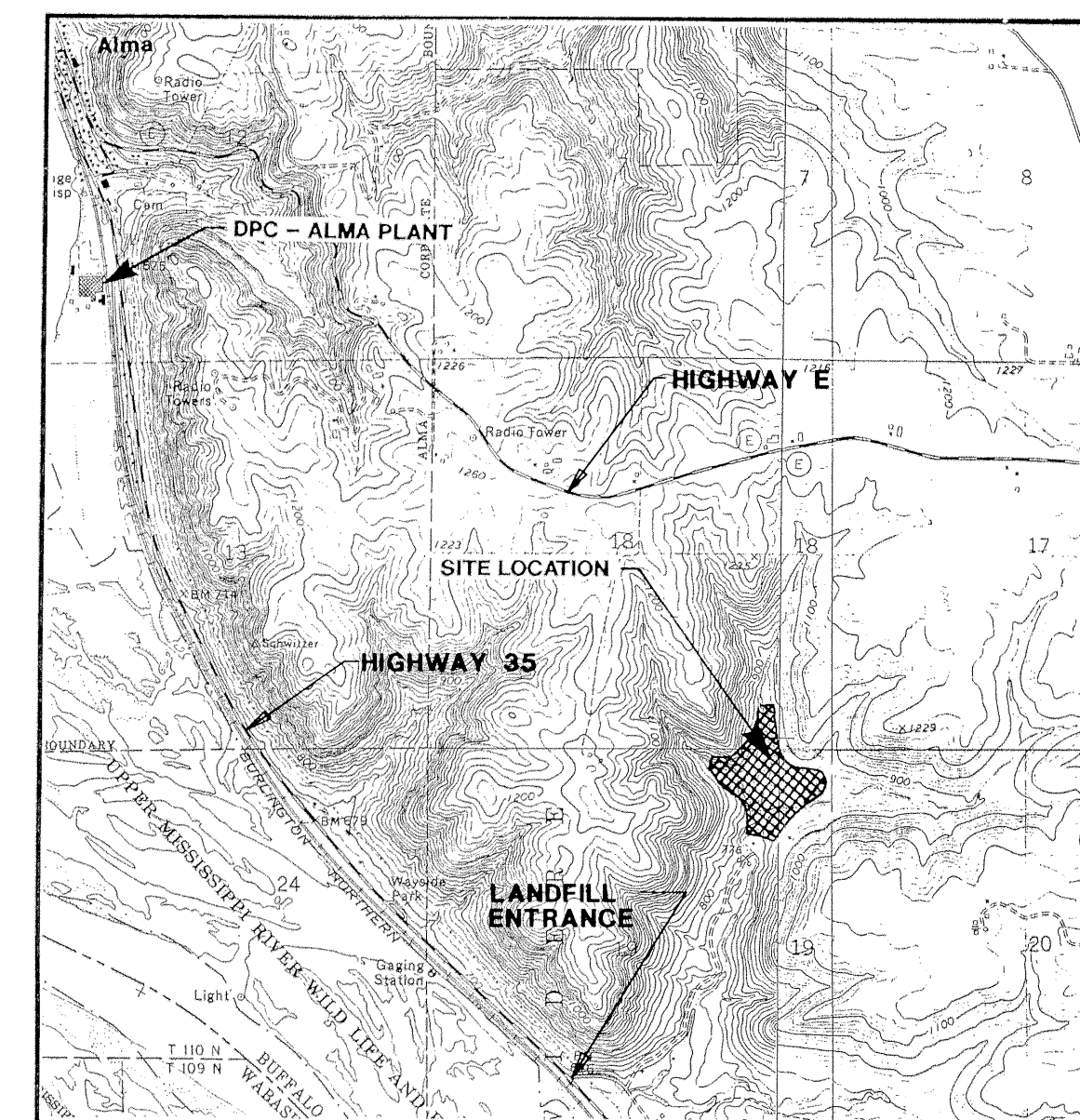
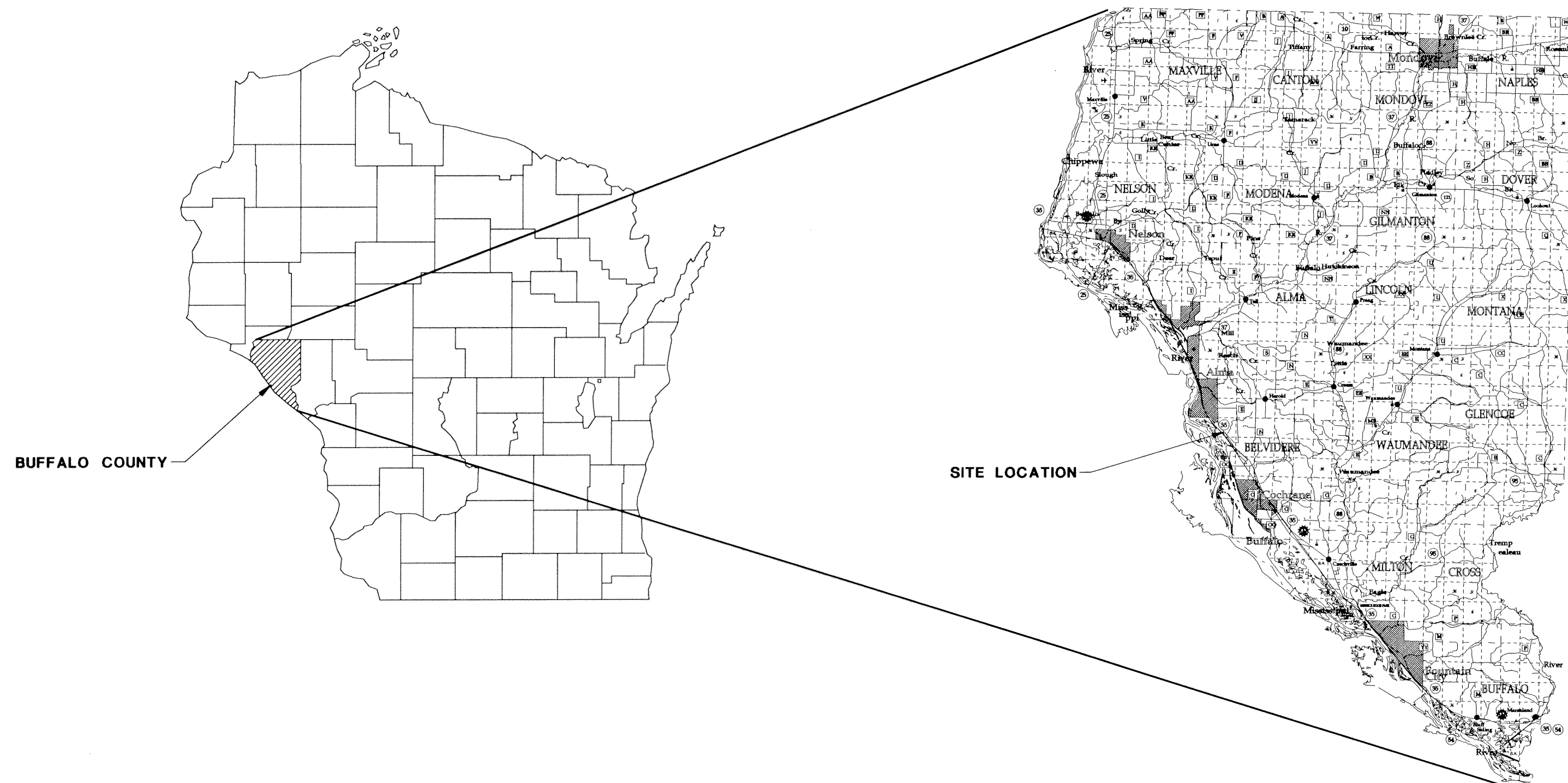
**PREPARED FOR: DAIRYLAND POWER COOPERATIVE
LACROSSE, WISCONSIN**

INDEX

**PREPARED BY: RMT, INC.
MADISON, WISCONSIN**

DATE: OCTOBER 2000

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MAP SOURCE: U.S.G.S. CREAM AND ALMA 7.5' QUADRANGLES, DATE 1974.

WISCONSIN

BUFFALO COUNTY

SITE LOCATION

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED AND REVIEWED TOGETHER. (NOT FOR CONSTRUCTION)

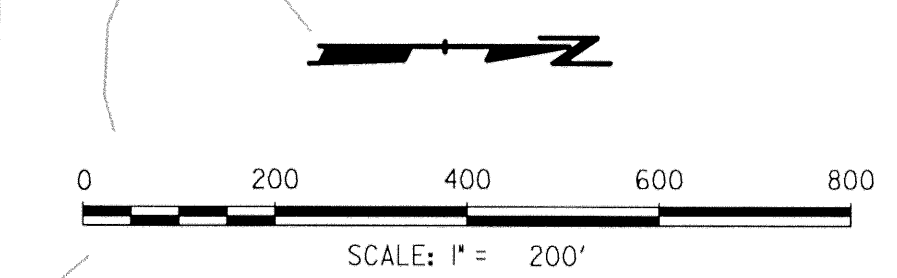
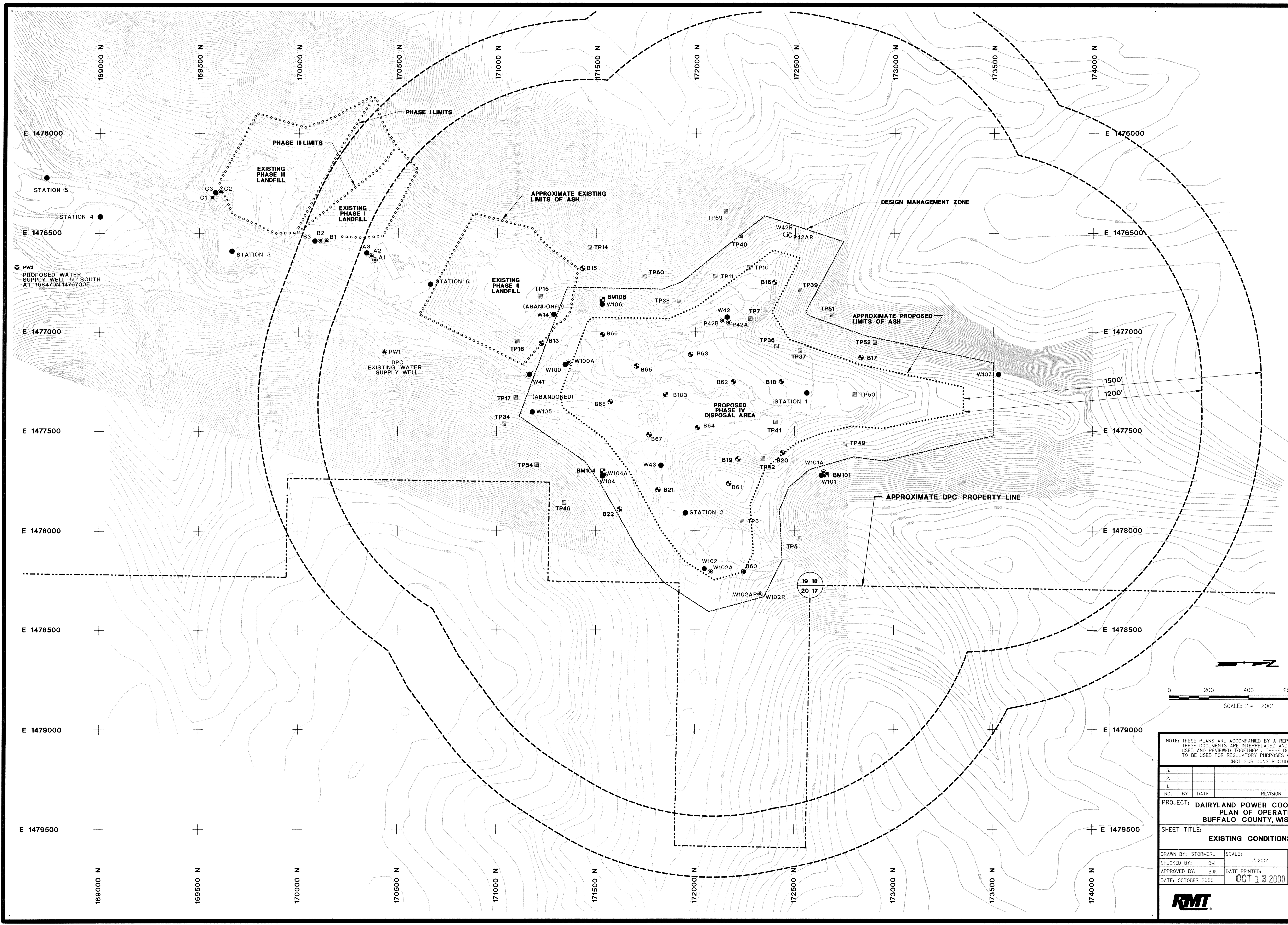


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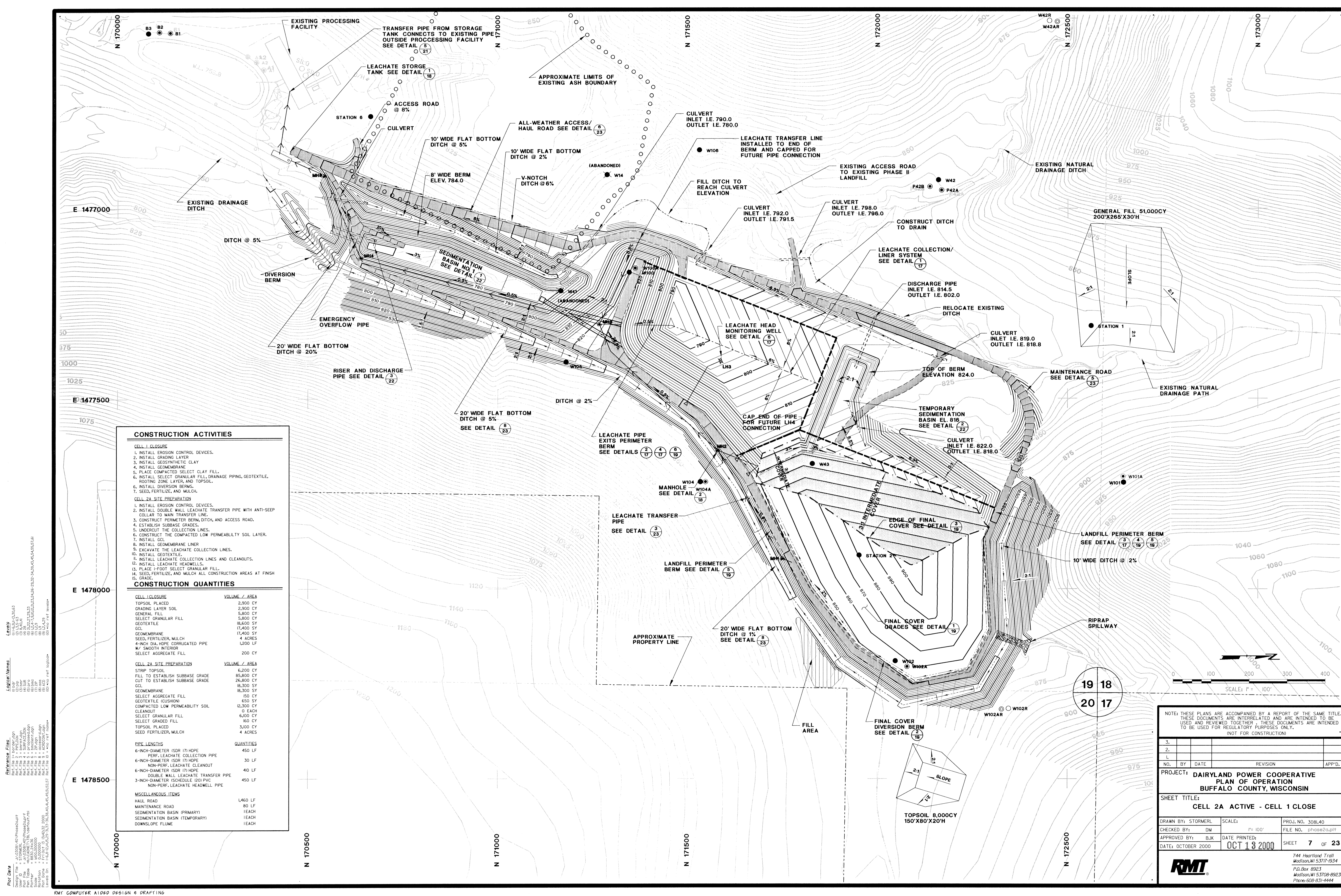
PROJECT: DAIRYLAND POWER COOPERATIVE
 PLAN OF OPERATION
 BUFFALO COUNTY, WISCONSIN

SHEET TITLE: **EXISTING CONDITIONS MAP**

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CHECKED BY: DM	DATE PRINTED: OCT 13 2000	FILE NO. EXIST.PLT
APPROVED BY: BLK	DATE: OCTOBER 2000	SHEET 3 OF 23

744 Heartland Trail
 Madison, WI 53717-1934
 P.O. Box 8923
 Madison, WI 53708-8923
 Phone: 608-831-4444

RMT



CONSTRUCTION ACTIVITIES

CELL 1 CLOSURE

1. INSTALL EROSION CONTROL DEVICES.
2. INSTALL GRADING LAYER.
3. INSTALL GEOSYNTHETIC CLAY.
4. INSTALL GEOMEMBRANE.
5. PLACE COMPACTED SELECT CLAY FILL.
6. INSTALL SELECT GRANULAR FILL, DRAINAGE PIPING, GEOTEXTILE, ROOTING ZONE LAYER, AND TOPSOIL.
7. SEED, FERTILIZE, AND MULCH.

CELL 2A SITE PREPARATION

1. INSTALL EROSION CONTROL DEVICES.
2. INSTALL DOUBLE WALL LEACHATE TRANSFER PIPE WITH ANTI-SEEP COLLAR TO MAIN TRANSFER LINE.
3. CONSTRUCT PERIMETER BERM, DITCH, AND ACCESS ROAD.
4. ESTABLISH SUBBASE GRADES.
5. UNDERCUT THE COLLECTION LINES.
6. CONSTRUCT THE COMPACTED LOW PERMEABILITY SOIL LAYER.
7. INSTALL GCL.
8. INSTALL GEOMEMBRANE LINER.
9. EXCAVATE THE LEACHATE COLLECTION LINES.
10. INSTALL GEOTEXTILE.
11. INSTALL LEACHATE COLLECTION LINES AND CLEANOUTS.
12. INSTALL LEACHATE HEADWELLS.
13. PLACE 1-FEET SELECT GRANULAR FILL.
14. SEED, FERTILIZE, AND MULCH ALL CONSTRUCTION AREAS AT FINISH.
15. GRADE.

CONSTRUCTION QUANTITIES

CELL 1 CLOSURE	VOLUME / AREA
TOPSOIL PLACED	2,900 CY
GRADING LAYER SOIL	2,900 CY
GENERAL FILL	5,800 CY
SELECT GRANULAR FILL	5,800 CY
GEOTEXTILE	18,600 SY
GCL	17,400 SY
GEOMEMBRANE	17,400 SY
SEED, FERTILIZER, MULCH	4 ACRES
4-INCH DIA. HDPE CORRUGATED PIPE W/ SMOOTH INTERIOR	1,200 LF
SELECT AGGREGATE FILL	200 CY

CELL 2A SITE PREPARATION	VOLUME / AREA
STRIP TOPSOIL	6,200 CY
FILL TO ESTABLISH SUBBASE GRADE	85,600 CY
CUT TO ESTABLISH SUBBASE GRADE	26,800 CY
GCL	18,300 SY
GEOMEMBRANE	18,300 SY
SELECT AGGREGATE FILL	150 CY
GEOTEXTILE (CUSHION)	650 SY
COMPACTED LOW PERMEABILITY SOIL	12,300 CY
CLEANOUT	0 EACH
SELECT GRANULAR FILL	6,000 CY
SELECT GRADED FILL	160 CY
TOPSOIL PLACED	3,000 CY
SEED FERTILIZER, MULCH	4 ACRES

PIPE LENGTHS	QUANTITIES
6-INCH-DIAMETER (SDR 17) HDPE PERF. LEACHATE COLLECTION PIPE	450 LF
6-INCH-DIAMETER (SDR 17) HDPE NON-PERF. LEACHATE CLEANOUT	30 LF
6-INCH-DIAMETER (SDR 17) HDPE DOUBLE WALL LEACHATE TRANSFER PIPE	410 LF
3-INCH-DIAMETER (SCHEDULE 120) PVC NON-PERF. LEACHATE HEADWELL PIPE	450 LF

MISCELLANEOUS ITEMS

HAUL ROAD	1,460 LF
MAINTENANCE ROAD	80 LF
SEDIMENTATION BASIN (PRIMARY)	1 EACH
SEDIMENTATION BASIN (TEMPORARY)	1 EACH
DOWNSLOPE FLUME	1 EACH

Levels

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NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED AND REVIEWED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY. (NOT FOR CONSTRUCTION)

NO.	BY	DATE	REVISION	APP'D.
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2.				
3.				

PROJECT: DAIRYLAND POWER COOPERATIVE
 PLAN OF OPERATION
 BUFFALO COUNTY, WISCONSIN

SHEET TITLE:
 CELL 2A ACTIVE - CELL 1 CLOSE

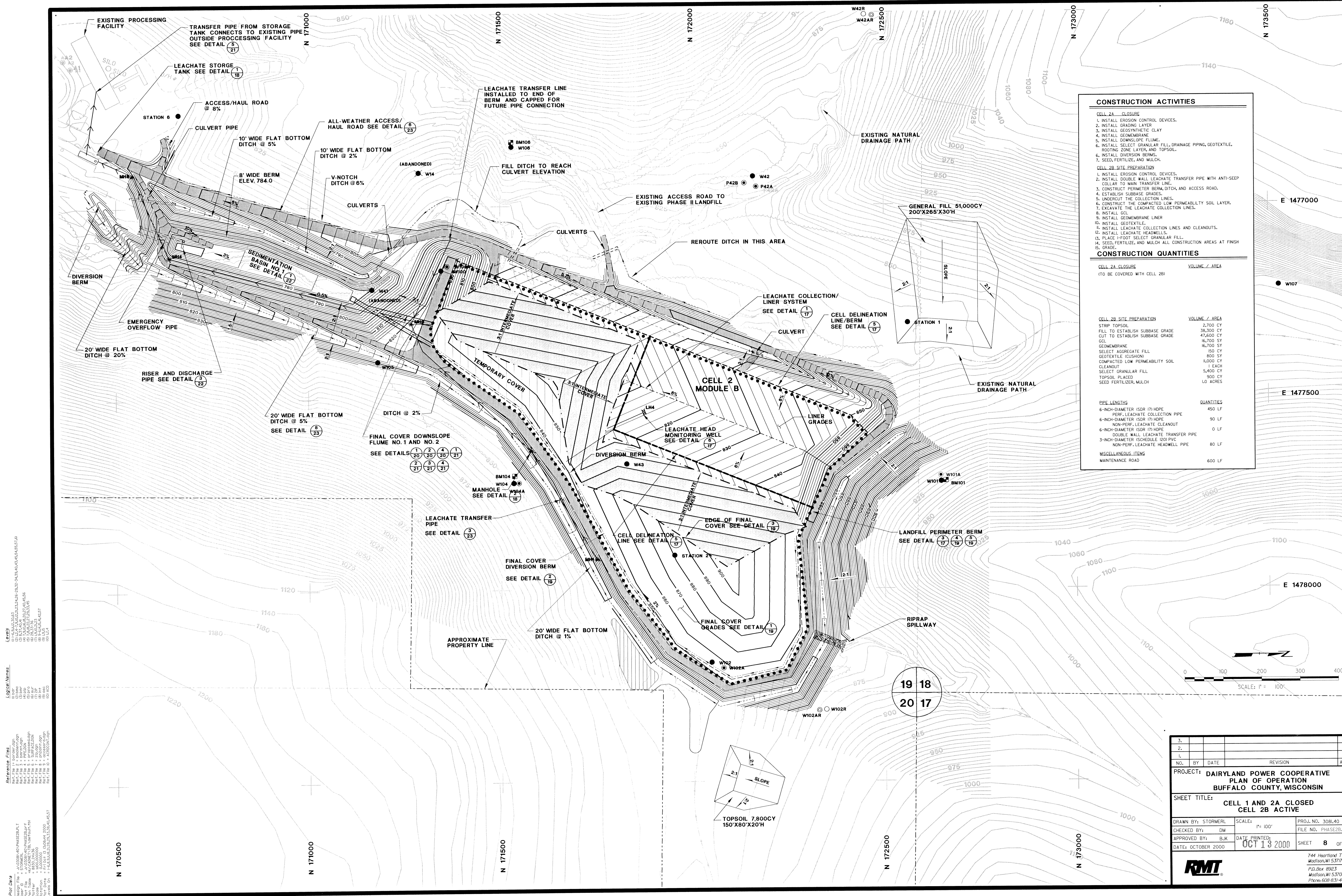
DRAWN BY:	SCALE:	PROJ. NO.
STORMERL	1" = 100'	308140

CHECKED BY:	FILE NO.
DM	phase2a.pit

APPROVED BY:	DATE PRINTED:	SHEET	OF
BLK	OCT 13 2000	7	23

DATE: OCTOBER 2000

144 Heartland Trail
 Madison, WI 53717-1534
 P.O. Box 8923
 Madison, WI 53708-8923
 Phone: 608-831-4444



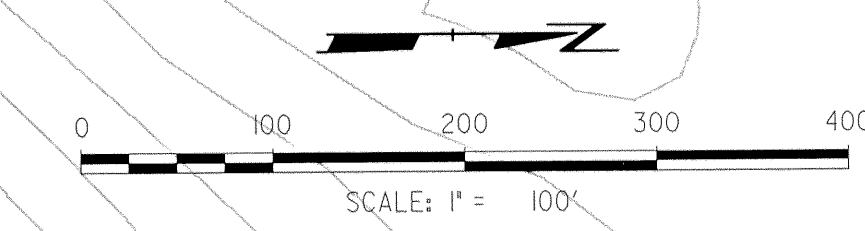
CONSTRUCTION ACTIVITIES	
CELL 2A CLOSURE	
1. INSTALL EROSION CONTROL DEVICES.	
2. INSTALL GRADING LAYER	
3. INSTALL GEOSYNTHETIC CLAY	
4. INSTALL GEOMEMBRANE	
5. INSTALL DOWNSLOPE FLUME	
6. INSTALL SELECT GRANULAR FILL, DRAINAGE PIPING, GEOTEXTILE, ROOTING ZONE LAYER, AND TOPSOIL.	
7. INSTALL DIVERSION BERMS.	
8. SEED, FERTILIZE, AND MULCH.	
CELL 2B SITE PREPARATION	
1. INSTALL EROSION CONTROL DEVICES.	
2. INSTALL DOUBLE WALL LEACHATE TRANSFER PIPE WITH ANTI-SEEP COLLAR TO MAIN TRANSFER LINE.	
3. CONSTRUCT PERIMETER BERM, DITCH, AND ACCESS ROAD.	
4. ESTABLISH SUBBASE GRADES.	
5. UNDERCUT THE COLLECTION LINES.	
6. CONSTRUCT THE COMPACTED LOW PERMEABILITY SOIL LAYER.	
7. EXCAVATE THE LEACHATE COLLECTION LINES.	
8. INSTALL GCL	
9. INSTALL GEOMEMBRANE LINER	
10. INSTALL GEOTEXTILE.	
11. INSTALL LEACHATE COLLECTION LINES AND CLEANDOUTS.	
12. INSTALL LEACHATE HEADWELLS.	
13. PLACE HFOOT SELECT GRANULAR FILL.	
14. SEED, FERTILIZE, AND MULCH ALL CONSTRUCTION AREAS AT FINISH	
15. GRADE.	
CONSTRUCTION QUANTITIES	
CELL 2A CLOSURE (TO BE COVERED WITH CELL 2B)	VOLUME / AREA
CELL 2B SITE PREPARATION	VOLUME / AREA
STRIP TOPSOIL	2,700 CY
FILL TO ESTABLISH SUBBASE GRADE	38,300 CY
CUT TO ESTABLISH SUBBASE GRADE	47,600 CY
GCL	16,700 SY
GEOMEMBRANE	16,700 SY
SELECT AGGREGATE FILL	150 CY
GEOTEXTILE (CUSHION)	800 SY
COMPACTED LOW PERMEABILITY SOIL	5,000 CY
CLEANDOUT	1 EACH
SELECT GRANULAR FILL	5,400 CY
TOPSOIL PLACED	950 CY
SEED FERTILIZER, MULCH	1.0 ACRES
PIPE LENGTHS	
6-INCH-DIAMETER (SDR 17) HDPE	450 LF
PERF. LEACHATE COLLECTION PIPE	90 LF
6-INCH-DIAMETER (SDR 17) HDPE	90 LF
NON-PERF. LEACHATE CLEANOUT	0 LF
6-INCH-DIAMETER (SDR 17) HDPE	0 LF
DOUBLE WALL LEACHATE TRANSFER PIPE	80 LF
3-INCH-DIAMETER SCHEDULE 800 PVC	80 LF
NON-PERF. LEACHATE HEADWELL PIPE	80 LF
MISCELLANEOUS ITEMS	
MAINTENANCE ROAD	600 LF

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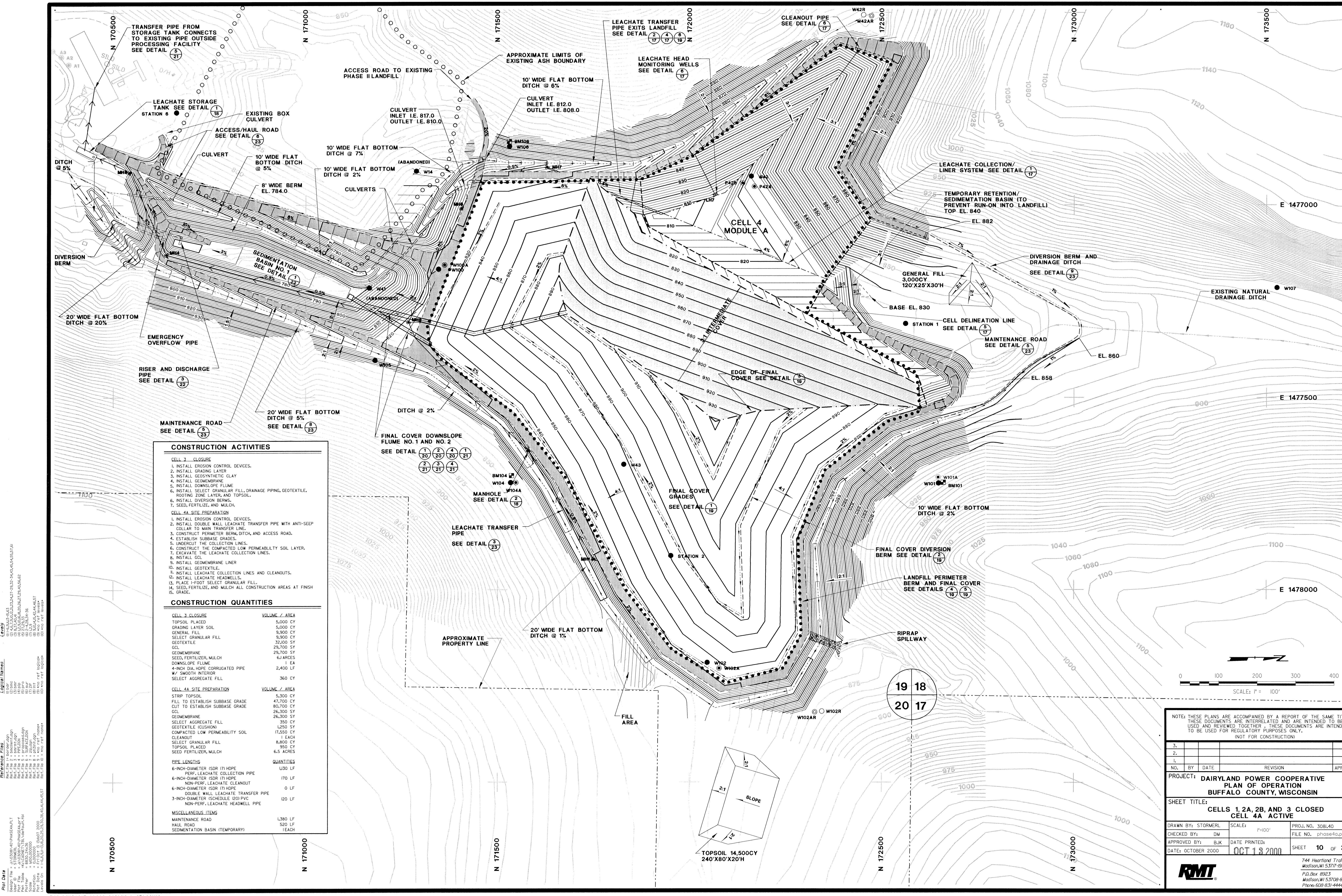
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Reference Files
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Plot Data
 User: J. STORMER
 Title: CELL 1 AND 2A CLOSED
 Date: 10/13/2000
 Plotter: HPGL
 Plot Style: RMT.ctb
 Scale: 1"=100'
 Levels ON
 Level: 01



NO.	BY	DATE	REVISION	APP'D.
PROJECT: DAIRYLAND POWER COOPERATIVE PLAN OF OPERATION BUFFALO COUNTY, WISCONSIN				
SHEET TITLE: CELL 1 AND 2A CLOSED CELL 2B ACTIVE				
DRAWN BY: STORMER		SCALE: 1"=100'		PROJ. NO. 3081.40
CHECKED BY: DM		DATE PRINTED: OCT 13 2000		FILE NO. PHASE2B.PLT
APPROVED BY: BJK		DATE: OCTOBER 2000		SHEET 8 OF 23
RMT				
744 Heartland Trail Madison, WI 53717-1934 P.O. Box 8923 Madison, WI 53708-8923 Phone: 608-631-4444				



CONSTRUCTION ACTIVITIES

- CELL 3 CLOSURE**
1. INSTALL EROSION CONTROL DEVICES.
 2. INSTALL GRADING LAYER.
 3. INSTALL GEOSYNTHETIC CLAY.
 4. INSTALL GEOMEMBRANE.
 5. INSTALL DOWNSLOPE FLUME.
 6. INSTALL SELECT GRANULAR FILL, DRAINAGE PIPING, GEOTEXTILE, ROOTING ZONE LAYER, AND TOPSOIL.
 7. SEED, FERTILIZE, AND MULCH.
- CELL 4A SITE PREPARATION**
1. INSTALL EROSION CONTROL DEVICES.
 2. INSTALL DOUBLE WALL LEACHATE TRANSFER PIPE WITH ANTI-SEEP COLLAR TO MAIN TRANSFER LINE.
 3. CONSTRUCT PERIMETER BERM, DITCH, AND ACCESS ROAD.
 4. ESTABLISH SUBBASE GRADES.
 5. UNDERCUT THE COLLECTION LINES.
 6. CONSTRUCT THE COMPACTED LOW PERMEABILITY SOIL LAYER.
 7. EXCAVATE THE LEACHATE COLLECTION LINES.
 8. INSTALL GCL.
 9. INSTALL GEOMEMBRANE LINER.
 10. INSTALL GEOTEXTILE.
 11. INSTALL LEACHATE COLLECTION LINES AND CLEANOUTS.
 12. INSTALL LEACHATE HEADWELLS.
 13. PLACE 1-FOOT SELECT GRANULAR FILL.
 14. SEED, FERTILIZE, AND MULCH ALL CONSTRUCTION AREAS AT FINISH 15. GRADE.

CONSTRUCTION QUANTITIES

	VOLUME / AREA
CELL 3 CLOSURE	
TOPSOIL PLACED	5,000 CY
GRADING LAYER SOIL	5,000 CY
GENERAL FILL	9,900 CY
SELECT GRANULAR FILL	9,900 CY
GEOTEXTILE	32,000 SY
GCL	29,700 SY
GEOMEMBRANE	29,700 SY
SEED, FERTILIZER, MULCH	6.5 ACRES
DOWNSLOPE FLUME	1 EA
4-INCH DIA. HDPE CORRUGATED PIPE	2,400 LF
W/7 SMOOTH INTERIOR	
SELECT AGGREGATE FILL	360 CY
CELL 4A SITE PREPARATION	
STRIP TOPSOIL	5,300 CY
FILL TO ESTABLISH SUBBASE GRADE	47,700 CY
CUT TO ESTABLISH SUBBASE GRADE	80,700 CY
GCL	26,300 SY
GEOMEMBRANE	26,300 SY
SELECT AGGREGATE FILL	350 CY
GEOTEXTILE (CUSHION)	1,250 SY
COMPACTED LOW PERMEABILITY SOIL	17,550 CY
CLEANOUT	1 EACH
SELECT GRANULAR FILL	8,800 CY
TOPSOIL PLACED	950 CY
SEED FERTILIZER, MULCH	6.5 ACRES
PIPE LENGTHS	QUANTITIES
6-INCH-DIAMETER (SDR 17) HDPE	1,030 LF
PERF. LEACHATE COLLECTION PIPE	170 LF
6-INCH-DIAMETER (SDR 17) HDPE	170 LF
NON-PERF. LEACHATE CLEANOUT	0 LF
6-INCH-DIAMETER (SDR 17) HDPE	0 LF
DOUBLE WALL LEACHATE TRANSFER PIPE	120 LF
3-INCH-DIAMETER (SCHEDULE 120) PVC	120 LF
NON-PERF. LEACHATE HEADWELL PIPE	
MISCELLANEOUS ITEMS	
MAINTENANCE ROAD	1,380 LF
HAUL ROAD	520 LF
SEDIMENTATION BASIN (TEMPORARY)	1 LEACH

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NO.	BY	DATE	REVISION	APP'D.

**PROJECT: DAIRYLAND POWER COOPERATIVE
PLAN OF OPERATION
BUFFALO COUNTY, WISCONSIN**

**SHEET TITLE:
CELLS 1, 2A, 2B, AND 3 CLOSED
CELL 4A ACTIVE**

DRAWN BY: STORMERL	SCALE: 1"=100'	PROJ. NO. 30BL40
CHECKED BY: DM	DATE PRINTED: OCT 13 2000	FILE NO. phase4a.plt
APPROVED BY: BJK		SHEET 10 OF 23
DATE: OCTOBER 2000		

744 Heartland Trail
Madison, WI 53717-9334
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608-831-4444

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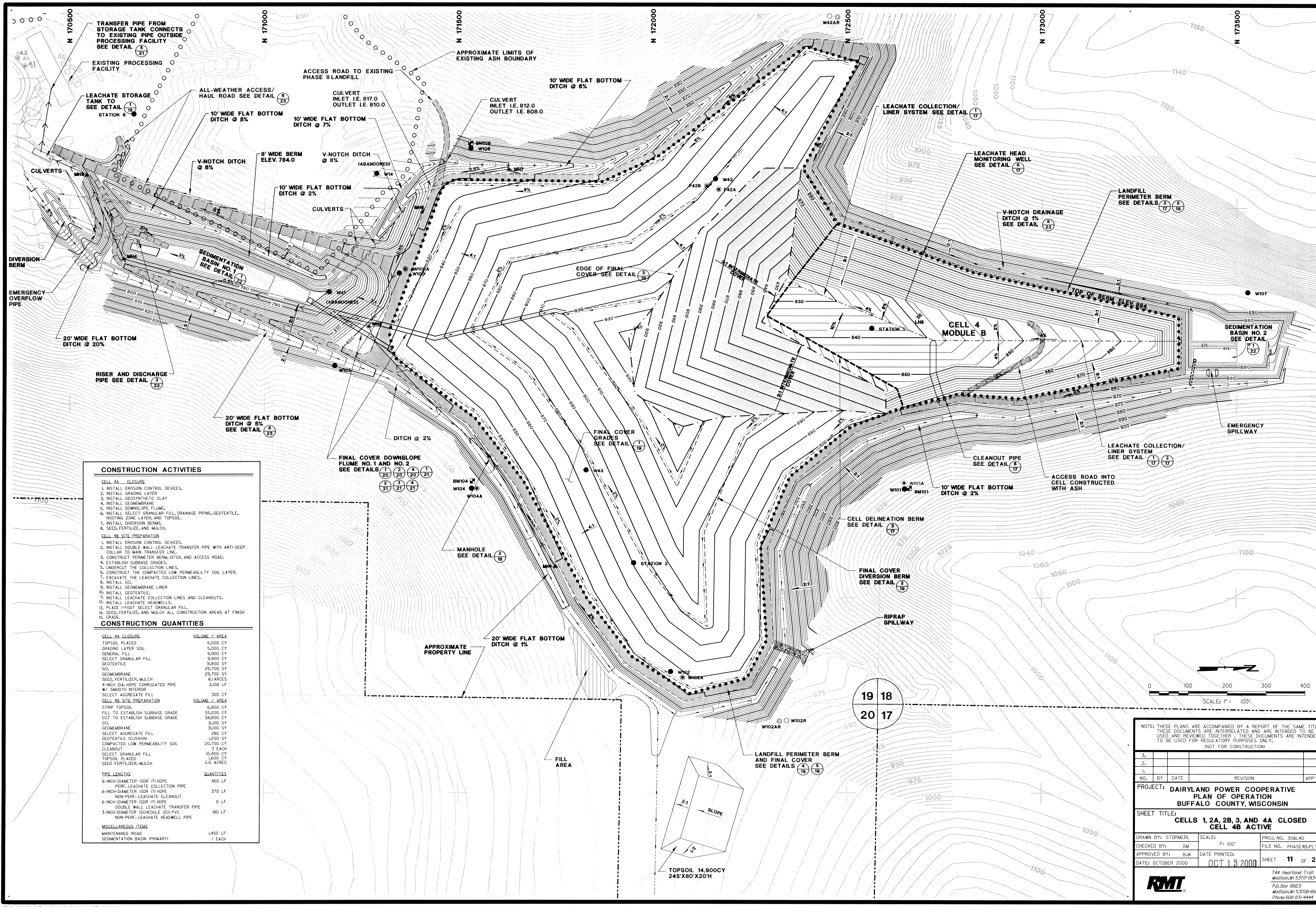
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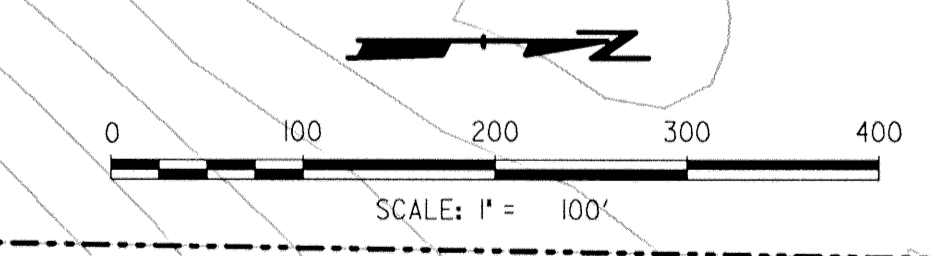


CONSTRUCTION ACTIVITIES

- CELL 4A CLOSURE**
1. INSTALL EROSION CONTROL DEVICES.
 2. INSTALL GRADING LAYER.
 3. INSTALL GEOSYNTHETIC CLAY.
 4. INSTALL GEOMEMBRANE.
 5. INSTALL DOWNSLOPE FLUME.
 6. INSTALL SELECT GRANULAR FILL, DRAINAGE PIPING, GEOTEXTILE, ROOTING ZONE LAYER, AND TOPSOIL.
 7. INSTALL DIVERSION BERMS.
 8. SEED, FERTILIZE, AND MULCH.
- CELL 4B SITE PREPARATION**
1. INSTALL EROSION CONTROL DEVICES.
 2. INSTALL DOUBLE WALL LEACHATE TRANSFER PIPE WITH ANTI-SEEP COLLAR TO MAIN TRANSFER LINE.
 3. CONSTRUCT PERIMETER BERM, DITCH, AND ACCESS ROAD.
 4. ESTABLISH SUBBASE GRADES.
 5. UNDERCUT THE COLLECTION LINES.
 6. CONSTRUCT THE COMPACTED LOW PERMEABILITY SOIL LAYER.
 7. EXCAVATE THE LEACHATE COLLECTION LINES.
 8. INSTALL GCL.
 9. INSTALL GEOMEMBRANE LINER.
 10. INSTALL GEOTEXTILE.
 11. INSTALL LEACHATE COLLECTION LINES AND CLEANOUTS.
 12. INSTALL LEACHATE HEADWELLS.
 13. PLACE 4-FEET SELECT GRANULAR FILL.
 14. SEED, FERTILIZE, AND MULCH ALL CONSTRUCTION AREAS AT FINISH IS GRADE.

CONSTRUCTION QUANTITIES

ITEM	VOLUME / AREA
CELL 4A CLOSURE	
TOPSOIL PLACED	5,000 CY
GRADING LAYER SOIL	5,000 CY
GENERAL FILL	9,900 CY
SELECT GRANULAR FILL	9,900 CY
GEOTEXTILE	3,800 SY
GCL	29,700 SY
GEOMEMBRANE	29,700 SY
SEED, FERTILIZER, MULCH	61 ACRES
4-INCH DIA. HDPE CORRUGATED PIPE	2,100 LF
W/ SMOOTH INTERIOR	
SELECT AGGREGATE FILL	320 CY
CELL 4B SITE PREPARATION	
STRIP TOPSOIL	6,800 CY
FILL TO ESTABLISH SUBBASE GRADE	55,200 CY
CUT TO ESTABLISH SUBBASE GRADE	58,800 CY
GCL	31,000 SY
GEOMEMBRANE	31,000 SY
SELECT AGGREGATE FILL	280 CY
GEOTEXTILE (CUSHION)	1,050 SY
COMPACTED LOW PERMEABILITY SOIL	20,700 CY
CLEANOUT	3 EACH
SELECT GRANULAR FILL	10,400 CY
TOPSOIL, PLACED	16,000 CY
SEED FERTILIZER, MULCH	2.0 ACRES
PIPE LENGTHS	
6-INCH-DIAMETER (SDR 17) HDPE	450 LF
PERF. LEACHATE COLLECTION PIPE	
6-INCH-DIAMETER (SDR 17) HDPE	370 LF
NON-PERF. LEACHATE CLEANOUT	0 LF
6-INCH-DIAMETER (SDR 17) HDPE	
DOUBLE WALL LEACHATE TRANSFER PIPE	180 LF
3-INCH-DIAMETER (SCHEDULE 120) PVC	
NON-PERF. LEACHATE HEADWELL PIPE	
MISCELLANEOUS ITEMS	
MAINTENANCE ROAD	1,450 LF
SEDIMENTATION BASIN (PRIMARY)	1 EACH



NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED AND REVIEWED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY. (NOT FOR CONSTRUCTION)

NO.	BY	DATE	REVISION	APP'D.

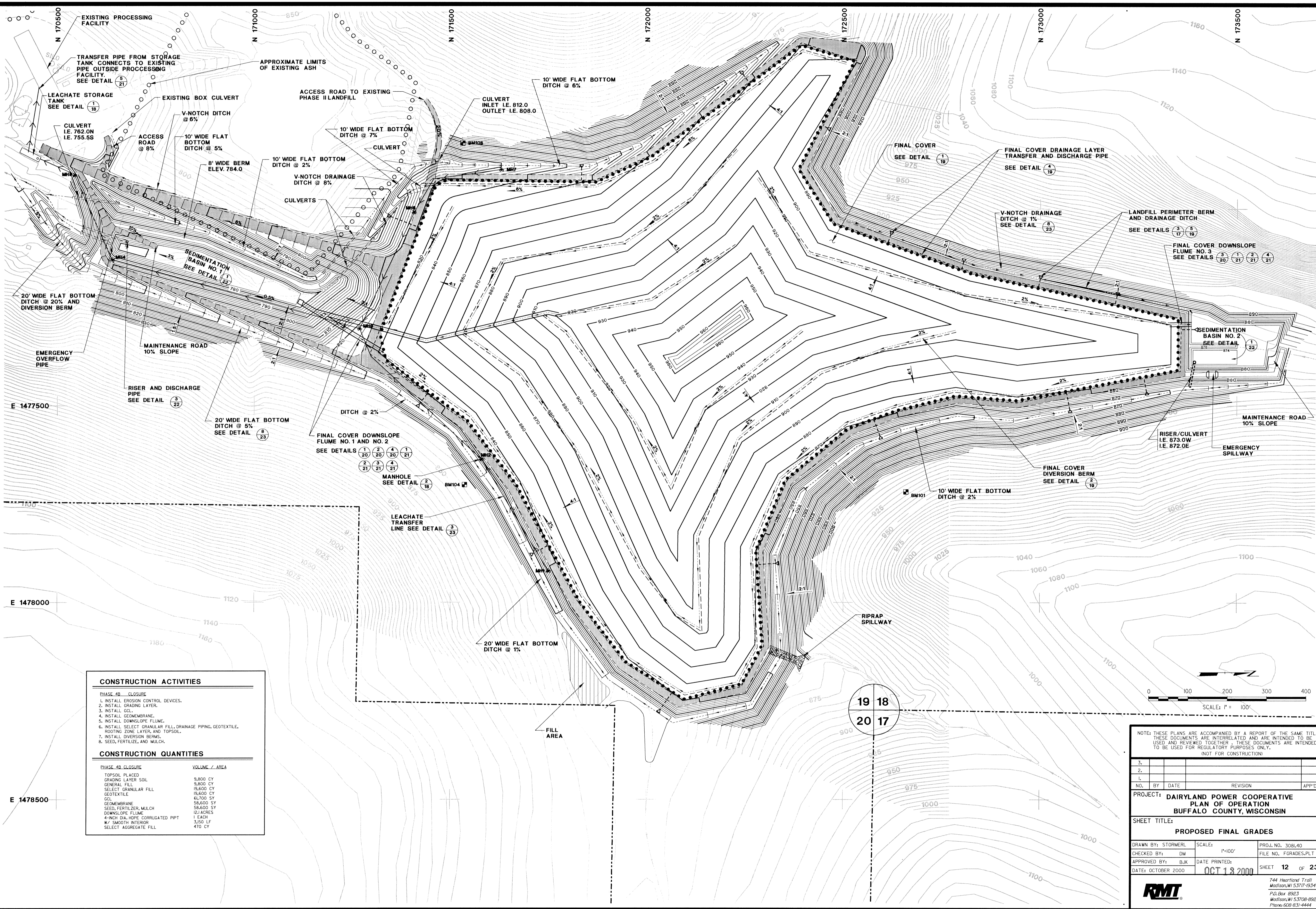
PROJECT: DAIRYLAND POWER COOPERATIVE
PLAN OF OPERATION
BUFFALO COUNTY, WISCONSIN

SHEET TITLE:
**CELLS 1, 2A, 2B, 3, AND 4A CLOSED
CELL 4B ACTIVE**

DRAWN BY: STORMERL	SCALE: 1" = 100'	PROJ. NO. 308140
CHECKED BY: DM	DATE PRINTED: OCT 13 2000	FILE NO. PHASE4B.PLT
APPROVED BY: BLK		SHEET 11 OF 23
DATE: OCTOBER 2000		



Logical Names: 01103, 01104, 01105, 01106, 01107, 01108, 01109, 01110, 01111, 01112, 01113, 01114, 01115, 01116, 01117, 01118, 01119, 01120, 01121, 01122, 01123, 01124, 01125, 01126, 01127, 01128, 01129, 01130, 01131, 01132, 01133, 01134, 01135, 01136, 01137, 01138, 01139, 01140, 01141, 01142, 01143, 01144, 01145, 01146, 01147, 01148, 01149, 01150, 01151, 01152, 01153, 01154, 01155, 01156, 01157, 01158, 01159, 01160, 01161, 01162, 01163, 01164, 01165, 01166, 01167, 01168, 01169, 01170, 01171, 01172, 01173, 01174, 01175, 01176, 01177, 01178, 01179, 01180, 01181, 01182, 01183, 01184, 01185, 01186, 01187, 01188, 01189, 01190, 01191, 01192, 01193, 01194, 01195, 01196, 01197, 01198, 01199, 01200, 01201, 01202, 01203, 01204, 01205, 01206, 01207, 01208, 01209, 01210, 01211, 01212, 01213, 01214, 01215, 01216, 01217, 01218, 01219, 01220, 01221, 01222, 01223, 01224, 01225, 01226, 01227, 01228, 01229, 01230, 01231, 01232, 01233, 01234, 01235, 01236, 01237, 01238, 01239, 01240, 01241, 01242, 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CONSTRUCTION ACTIVITIES	
PHASE 4B CLOSURE	
1. INSTALL EROSION CONTROL DEVICES.	
2. INSTALL GRADING LAYER.	
3. INSTALL GCL.	
4. INSTALL GEOMEMBRANE.	
5. INSTALL DOWNSLOPE FLUME.	
6. INSTALL SELECT GRANULAR FILL, DRAINAGE PIPING, GEOTEXTILE, ROOTING ZONE LAYER, AND TOPSOIL.	
7. INSTALL DIVERSION BERMS.	
8. SEED, FERTILIZE, AND MULCH.	
CONSTRUCTION QUANTITIES	
PHASE 4B CLOSURE	VOLUME / AREA
TOPSOIL PLACED	9,800 CY
GENERAL FILL	9,800 CY
SELECT GRANULAR FILL	19,600 CY
GEOTEXTILE	61,700 SY
GCL	58,600 SY
GEOMEMBRANE	58,600 SY
SEED, FERTILIZER, MULCH	58,600 SY
DOWNSLOPE FLUME	121 ACRES
4-INCH DIA. HDPE CORRUGATED PIP	1 EACH
W/ SMOOTH INTERIOR	3,350 LF
SELECT AGGREGATE FILL	470 CY

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED AND REVIEWED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY. (NOT FOR CONSTRUCTION)

NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

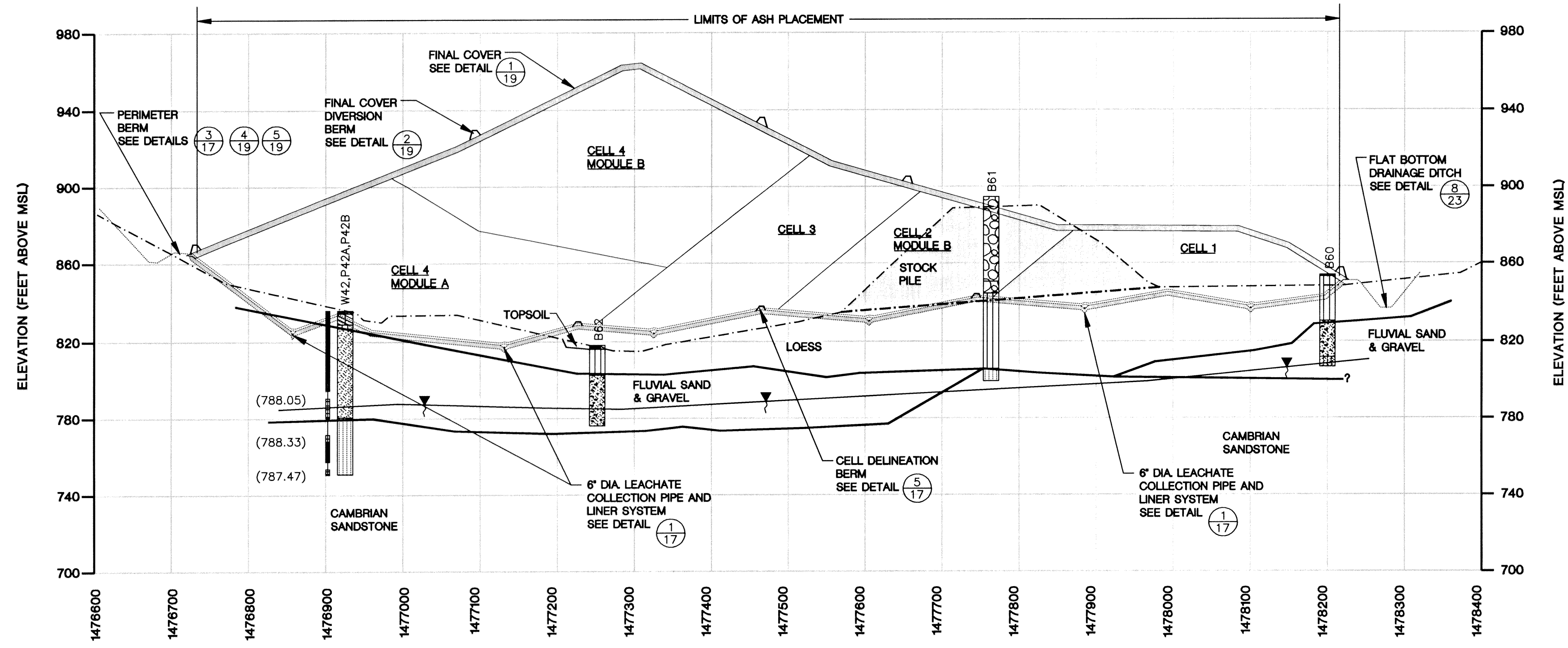
PROJECT: DAIRYLAND POWER COOPERATIVE
PLAN OF OPERATION
BUFFALO COUNTY, WISCONSIN

SHEET TITLE:
PROPOSED FINAL GRADES

DRAWN BY: STORMERL	SCALE: 1"=100'	PROJ. NO. 3081.40
CHECKED BY: DM		FILE NO. FGRADES.PLT
APPROVED BY: BJK	DATE PRINTED: OCT 13 2000	SHEET 12 OF 23
DATE: OCTOBER 2000		

RMT
744 Heartland Trail
Madison, WI 53717-1934
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608-831-4444

Levels
02.46, 02.02, 02.24, 02.38, 02.52, 03.41, 03.45, 03.51, 03.69
03.81, 03.87, 03.93, 04.00, 04.07, 04.14, 04.21, 04.28, 04.35, 04.42, 04.49, 04.56, 04.63, 04.70, 04.77, 04.84, 04.91, 04.98, 05.05, 05.12, 05.19, 05.26, 05.33, 05.40, 05.47, 05.54, 05.61, 05.68, 05.75, 05.82, 05.89, 05.96, 06.03, 06.10, 06.17, 06.24, 06.31, 06.38, 06.45, 06.52, 06.59, 06.66, 06.73, 06.80, 06.87, 06.94, 07.01, 07.08, 07.15, 07.22, 07.29, 07.36, 07.43, 07.50, 07.57, 07.64, 07.71, 07.78, 07.85, 07.92, 07.99, 08.06, 08.13, 08.20, 08.27, 08.34, 08.41, 08.48, 08.55, 08.62, 08.69, 08.76, 08.83, 08.90, 08.97, 09.04, 09.11, 09.18, 09.25, 09.32, 09.39, 09.46, 09.53, 09.60, 09.67, 09.74, 09.81, 09.88, 09.95, 10.02, 10.09, 10.16, 10.23, 10.30, 10.37, 10.44, 10.51, 10.58, 10.65, 10.72, 10.79, 10.86, 10.93, 11.00, 11.07, 11.14, 11.21, 11.28, 11.35, 11.42, 11.49, 11.56, 11.63, 11.70, 11.77, 11.84, 11.91, 11.98, 12.05, 12.12, 12.19, 12.26, 12.33, 12.40, 12.47, 12.54, 12.61, 12.68, 12.75, 12.82, 12.89, 12.96, 13.03, 13.10, 13.17, 13.24, 13.31, 13.38, 13.45, 13.52, 13.59, 13.66, 13.73, 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CROSS SECTION 172200N

LEGEND

	PROPOSED FINAL COVER/BASE LINER		EXISTING GROUND SURFACE
	6" DIA. PERFORATED GRADIENT CONTROL/LEACHATE COLLECTION PIPE		WATER TABLE LINE
	APPROXIMATE DIVERSION BERM LOCATION		STRATIGRAPHIC BOUNDARY, DASHED WHERE INFERRERD
	MAIN GRADIENT CONTROL TRANSFER PIPE		
	(745.03) WATER TABLE OR PIEZOMETRIC ELEVATION		
	UNIT B AND C BOUNDARY		
	B61 BORING OR WELL NUMBER		

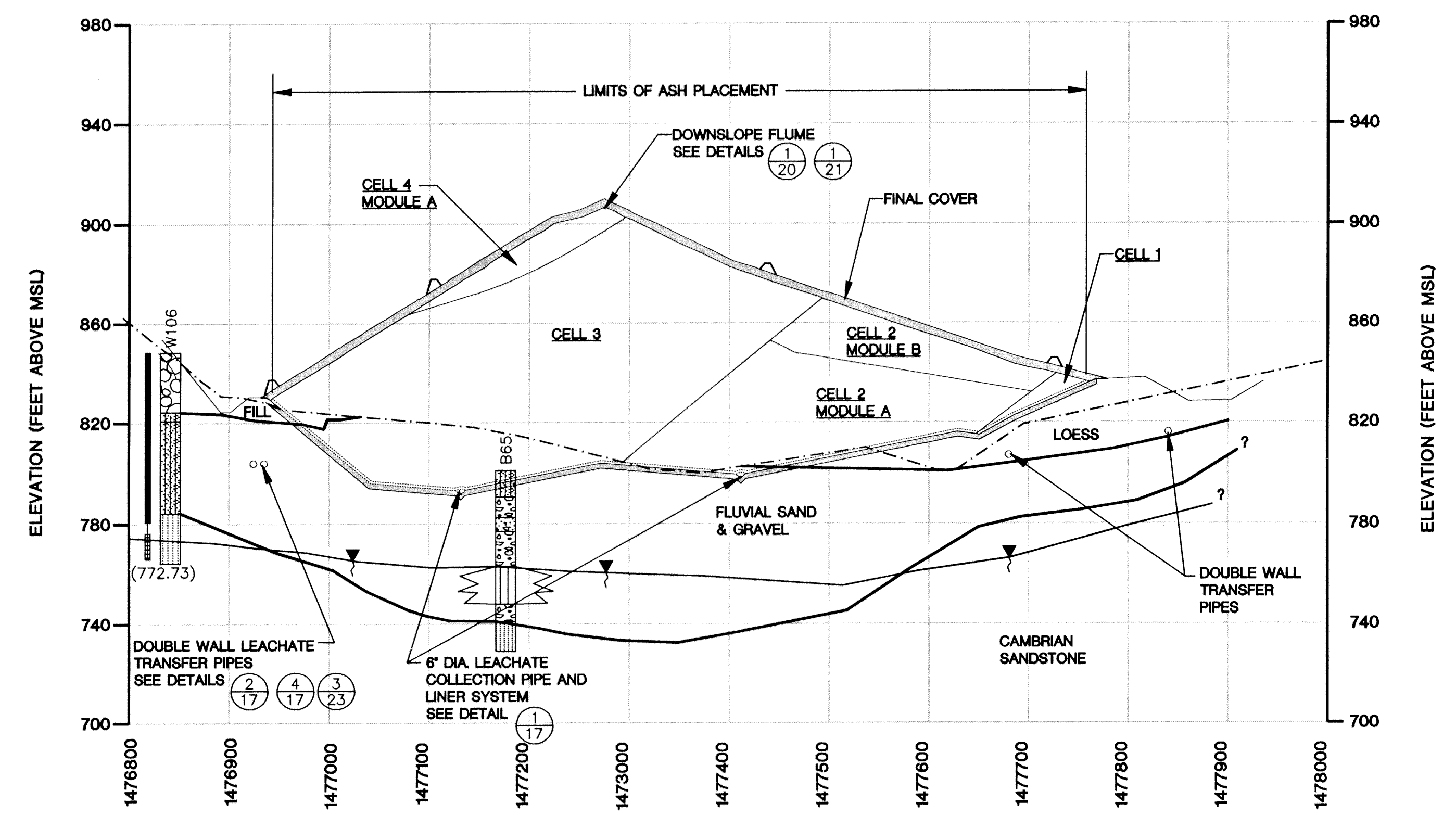
WELL CONSTRUCTION

	WELL SEAL
	WELL CASING
	WELL SCREEN

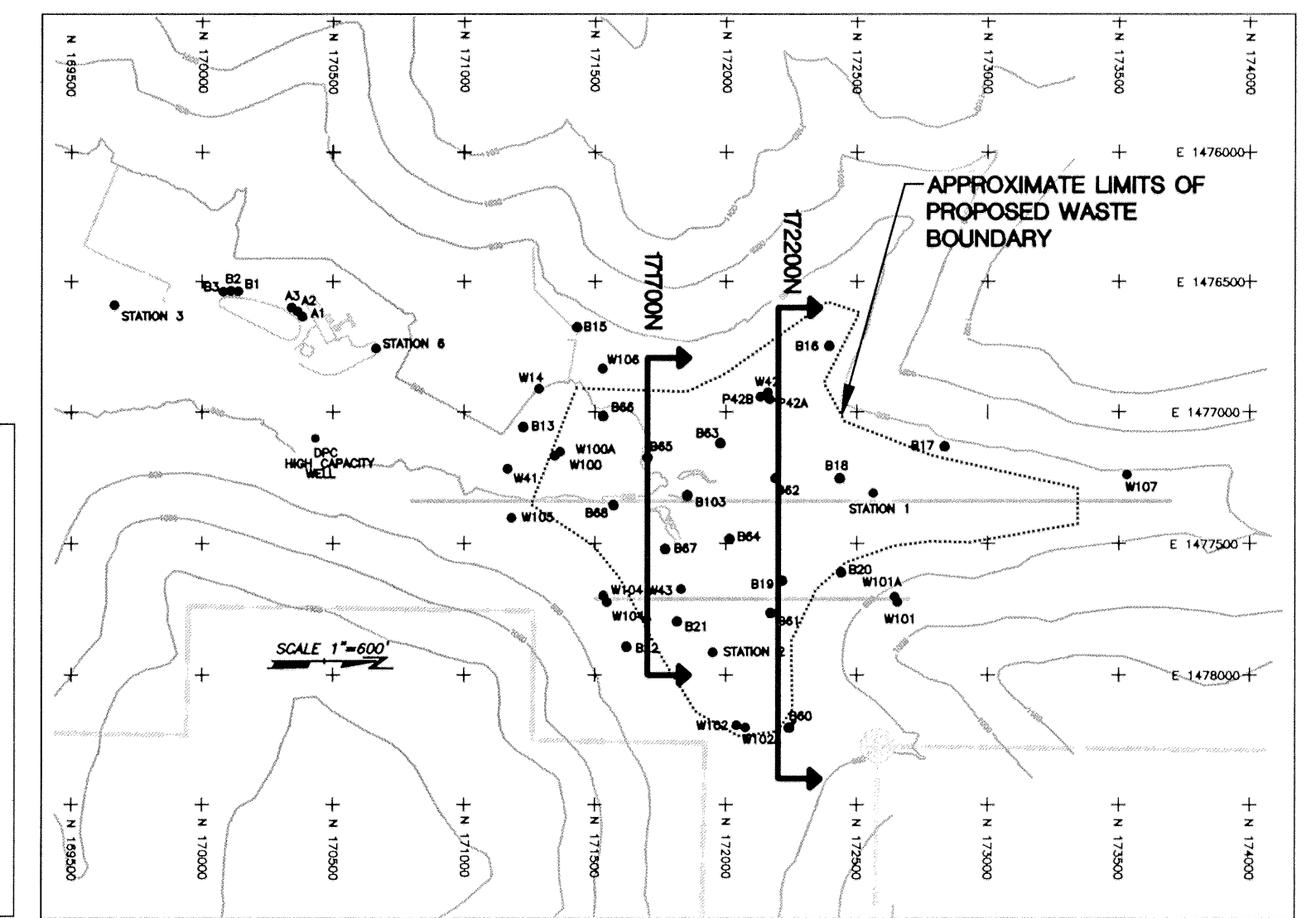
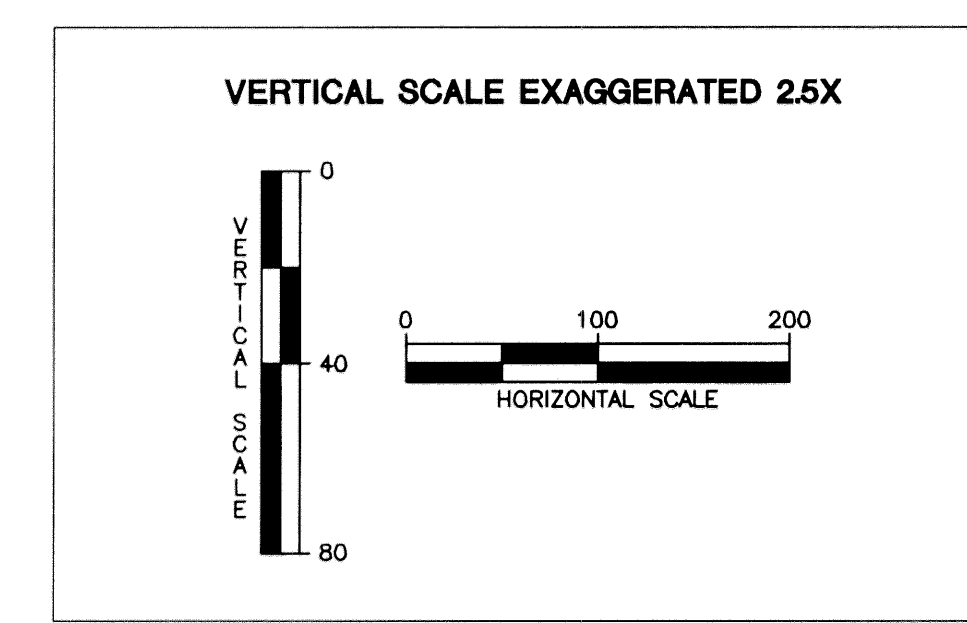
LITHOLOGIC UNITS (USCS CLASSIFICATION)

	TOPSOIL		POORLY GRADED GRAVEL
	FILL		SILTY GRAVEL WITH SAND (GM)
	SILT (ML)		SILTY SAND WITH GRAVEL (SM)
	CLAY (CL)		SILTY SAND (SM)
	SILTY CLAY (CL)		SANDSTONE
	CLAYEY SILT (ML)		DOLOMITE
	SAND (SP)		SANDY SILT

- NOTES**
- EXISTING GROUND SURFACE TAKEN FROM PLAN SHEET 3.
 - ELEVATION REFERENCED TO USGS MEAN SEA LEVEL (MSL) DATUM, 1929.
 - GROUNDWATER ELEVATIONS BASED ON MEASUREMENTS OBTAINED BY DPC ON APRIL 26, 1996.
 - THE STRATUM LINES ARE BASED ON INTERPOLATION BETWEEN BORINGS AND ON INFORMATION CONTAINED ON THE HIGH WATER TABLE CONTOUR MAP (PLAN SHEET 12) AND THE TOP OF COMPETENT BEDROCK CONTOUR MAP (PLAN SHEET 13) IN THE FEASIBILITY REPORT, AND ON THE BOTTOM OF LOESS EXISTING CONDITIONS (FIGURE 2) SHEET INCLUDED IN THE APRIL 30, 1999, SUPPLEMENTAL INFORMATION TO SUPPORT FEASIBILITY DETERMINATION. ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS MAY VARY. CORRELATIONS ARE SHOWN IN MORE DETAIL IN FEASIBILITY REPORT PLAN SHEETS 4-10 (RMT, SEPTEMBER 1997).
 - SOIL BORINGS AND WELLS HAVE BEEN PROJECTED ONTO THE CROSS SECTION.
 - SEE SHEET 4 FOR SUBBASE GRADES, SHEET 5 FOR BASE GRADES AND SHEET 12 FOR FINAL GRADES.
- (SEE SHEET 2 FOR STANDARD NOTES AND LEGEND)



CROSS SECTION 171700N



CROSS SECTION LOCATOR MAP

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED AND REVIEWED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY. (NOT FOR CONSTRUCTION)

3.				
2.				
1.				
NO.	BY	DATE	REVISION	APP'D.

PROJECT: DAIRYLAND POWER COOPERATIVE
PLAN OF OPERATION
BUFFALO COUNTY, WISCONSIN

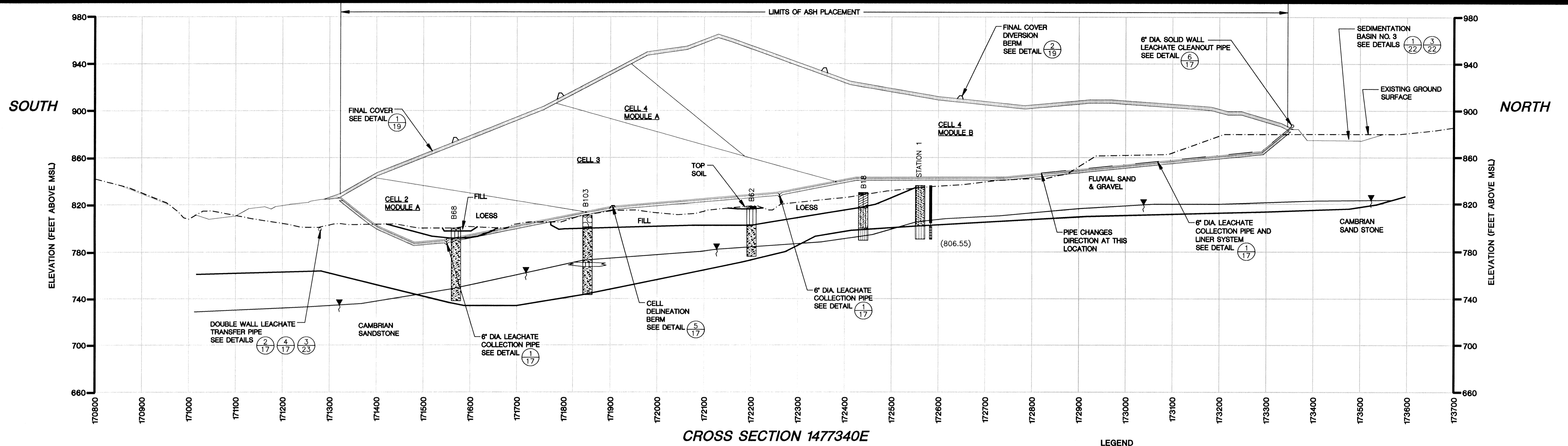
SHEET TITLE: ENGINEERING CROSS SECTIONS
171700N AND 172200N

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CHECKED BY:	VERT. 1"=40'	FILE NO. 30814001.DWG
APPROVED BY:	DATE PRINTED: OCT 13 2000	SHEET 15 OF 24
DATE: OCTOBER 2000		

744 Heartland Trail
Madison, WI 53717-1934
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608/831-4444

RMT.

PLOT FILE: J:\308140\30814001.dwg
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 Sheet: 15 of 24
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CROSS SECTION 1477340E

LEGEND

- PROPOSED FINAL COVER/BASE LINER
- 6" DIA. PERFORATED GRADIENT CONTROL/LEACHATE COLLECTION PIPE
- APPROXIMATE DIVERSION BERM LOCATION
- MAIN GRADIENT CONTROL TRANSFER PIPE (745.03)
- WATER TABLE OR PIEZOMETRIC ELEVATION UNIT B AND C BOUNDARY
- B61 BORING OR WELL NUMBER
- EXISTING GROUND SURFACE
- WATER TABLE LINE
- STRATIGRAPHIC BOUNDARY, DASHED WHERE INFERRRED

WELL CONSTRUCTION

- WELL SEAL
- WELL CASING
- WELL SCREEN

LITHOLOGIC UNITS (USCS CLASSIFICATION)

- TOPSOIL
- FILL
- SILTY (ML)
- CLAY (CL)
- SILTY CLAY (CL)
- CLAYEY SILTY (ML)
- SAND (SP)
- POORLY GRADED GRAVEL
- SILTY GRAVEL WITH SAND (GM)
- SILTY SAND WITH GRAVEL (SM)
- SILTY SAND (SM)
- SANDSTONE
- DOLOMITE
- SANDY SILTY

NOTES

1. EXISTING GROUND SURFACE TAKEN FROM PLAN SHEET 3.
 2. ELEVATION REFERENCED TO USGS MEAN SEA LEVEL (MSL) DATUM, 1929.
 3. GROUNDWATER ELEVATIONS BASED ON MEASUREMENTS OBTAINED BY DPC ON APRIL 26, 1996.
 4. THE STRATUM LINES ARE BASED ON INTERPOLATION BETWEEN BORINGS AND ON INFORMATION CONTAINED ON THE HIGHWATER TABLE CONTOUR MAP (PLAN SHEET 12) AND THE TOP OF COMPETENT BEDROCK CONTOUR MAP (PLAN SHEET 13) IN THE FEASIBILITY REPORT, AND ON THE BOTTOM OF LOESS EXISTING CONDITIONS (FIGURE 2) SHEET INCLUDED IN THE APRIL 30, 1999 SUPPLEMENTAL INFORMATION TO SUPPORT FEASIBILITY DETERMINATION. ACTUAL SUBSURFACE CONDITIONS BETWEEN BORINGS MAY VARY. CORRELATIONS ARE SHOWN IN MORE DETAIL IN FEASIBILITY REPORT PLAN SHEETS 4-10 (RMT, SEPTEMBER 1997).
 5. SOIL BORINGS AND WELLS HAVE BEEN PROJECTED ONTO THE CROSS SECTION.
 6. SEE SHEET 4 FOR SUBBASE GRADES, SHEET 5 FOR BASE GRADES AND SHEET 12 FOR FINAL GRADES.
- (SEE SHEET 2 FOR STANDARD NOTES AND LEGEND)

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED AND REVIEWED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY. (NOT FOR CONSTRUCTION)

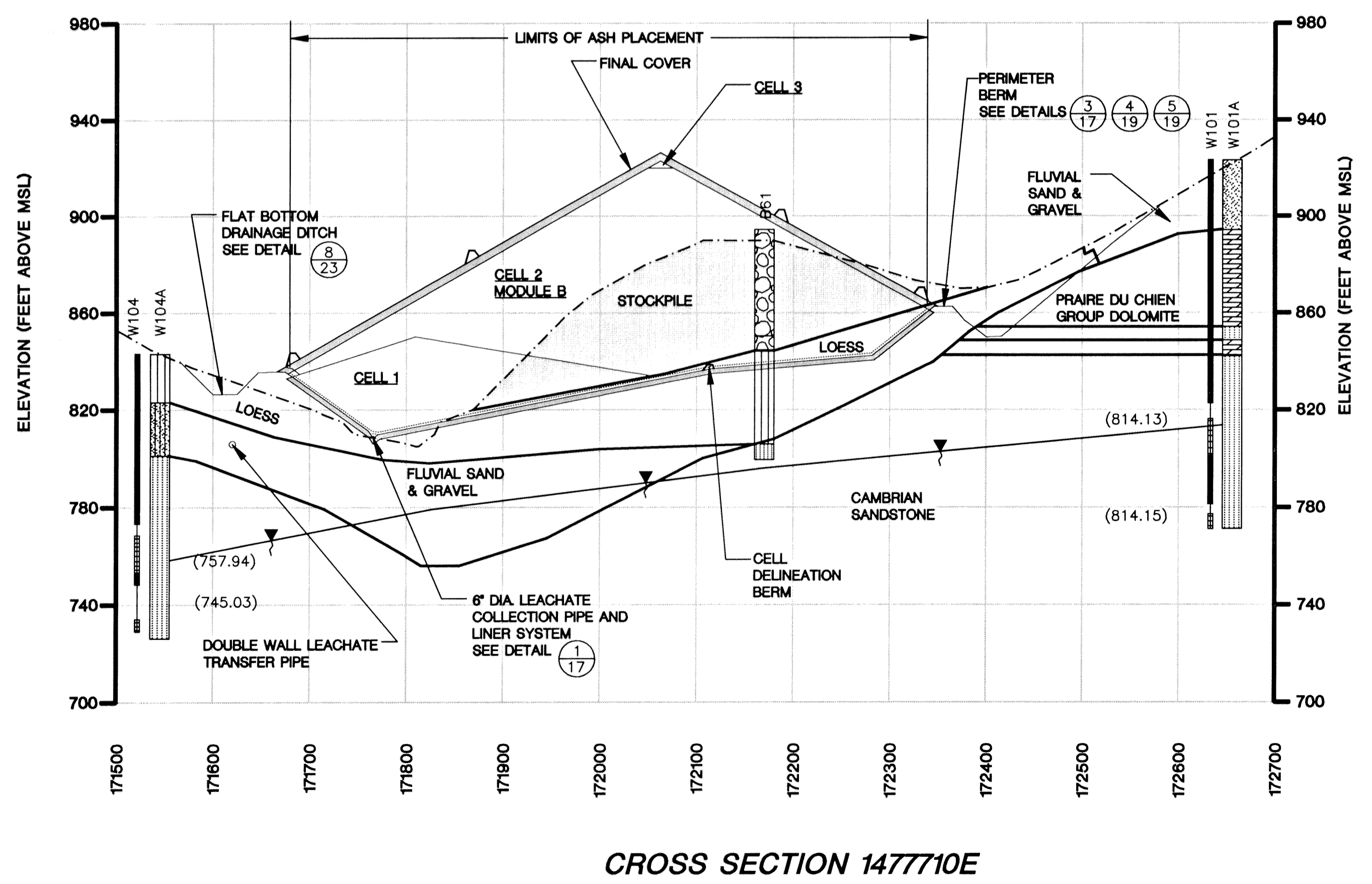
3.			
2.			
1.			
NO.	BY	DATE	REVISION
			APP'D.

PROJECT: DAIRYLAND POWER COOPERATIVE
PLAN OF OPERATION
BUFFALO COUNTY, WISCONSIN

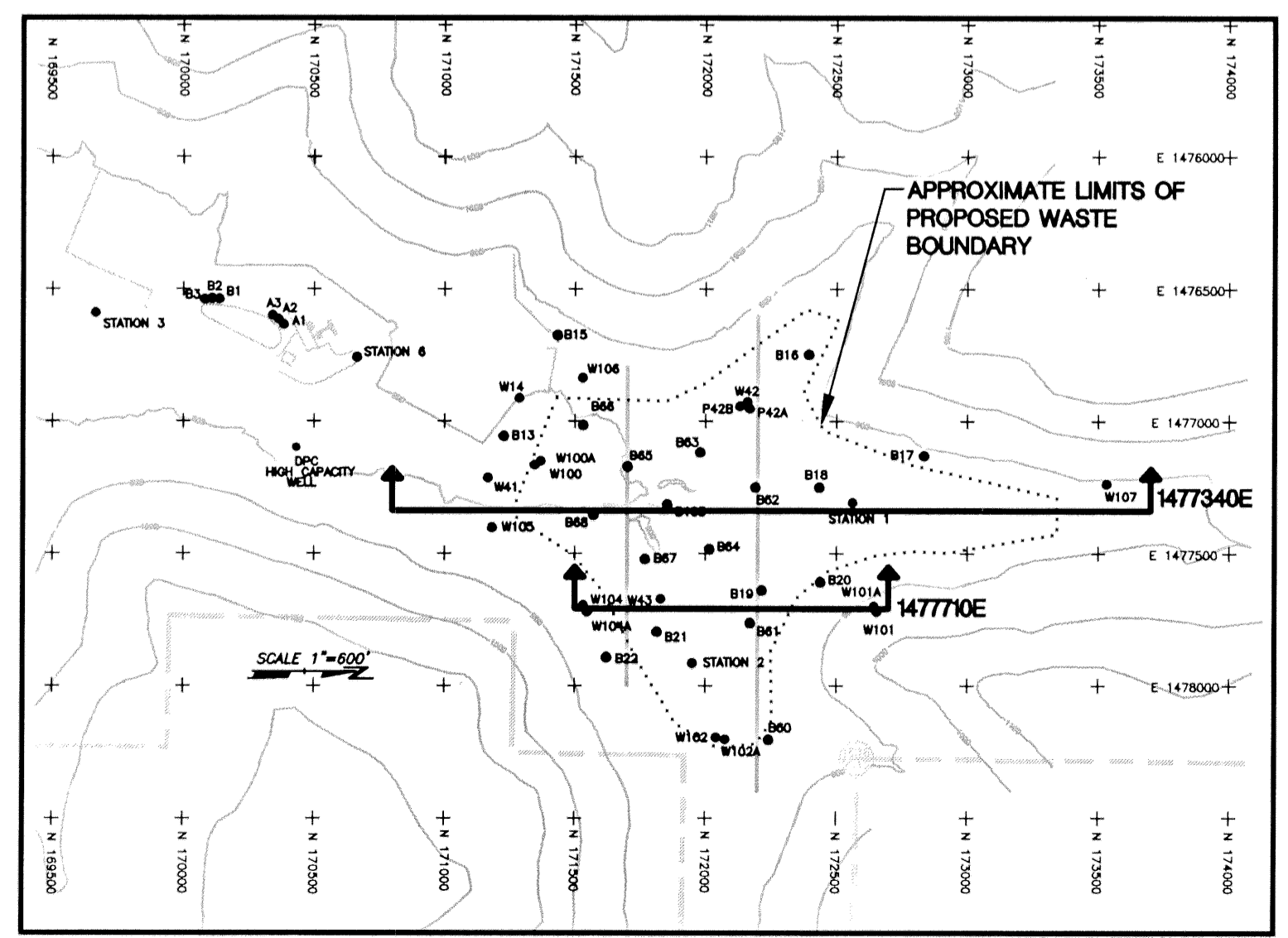
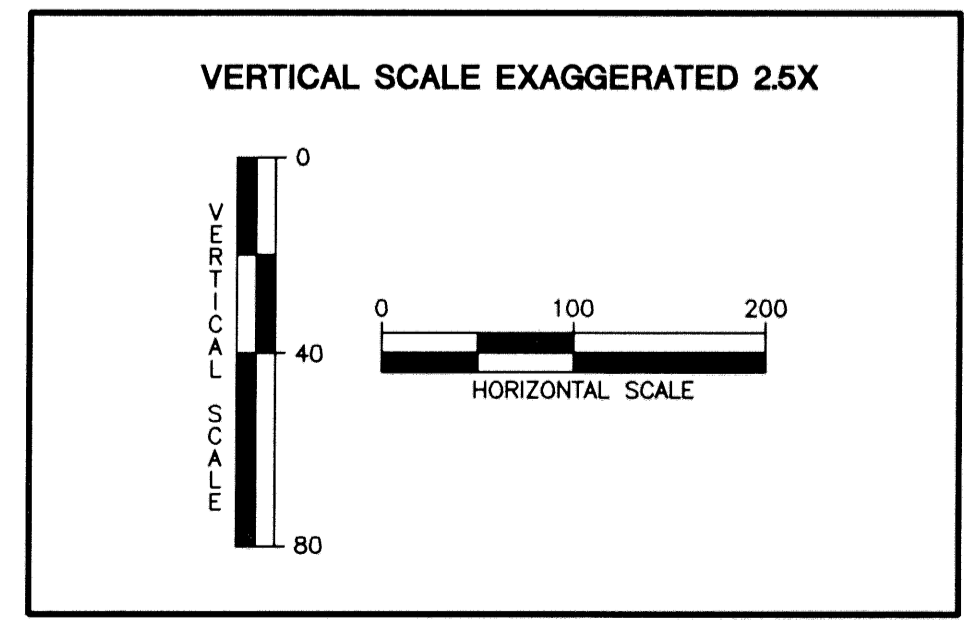
SHEET TITLE: ENGINEERING CROSS SECTIONS
1477340E AND 1477710E

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CHECKED BY:	VERT. 1"=40'	FILE NO. 30814002.DWG
APPROVED BY:	DATE PRINTED: OCT 13 2000	SHEET 16 OF 24
DATE: OCTOBER 2000		

744 Heartland Trail
Madison, WI 53717-1934
P.O. Box 8923
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Phone: 608/831-4444

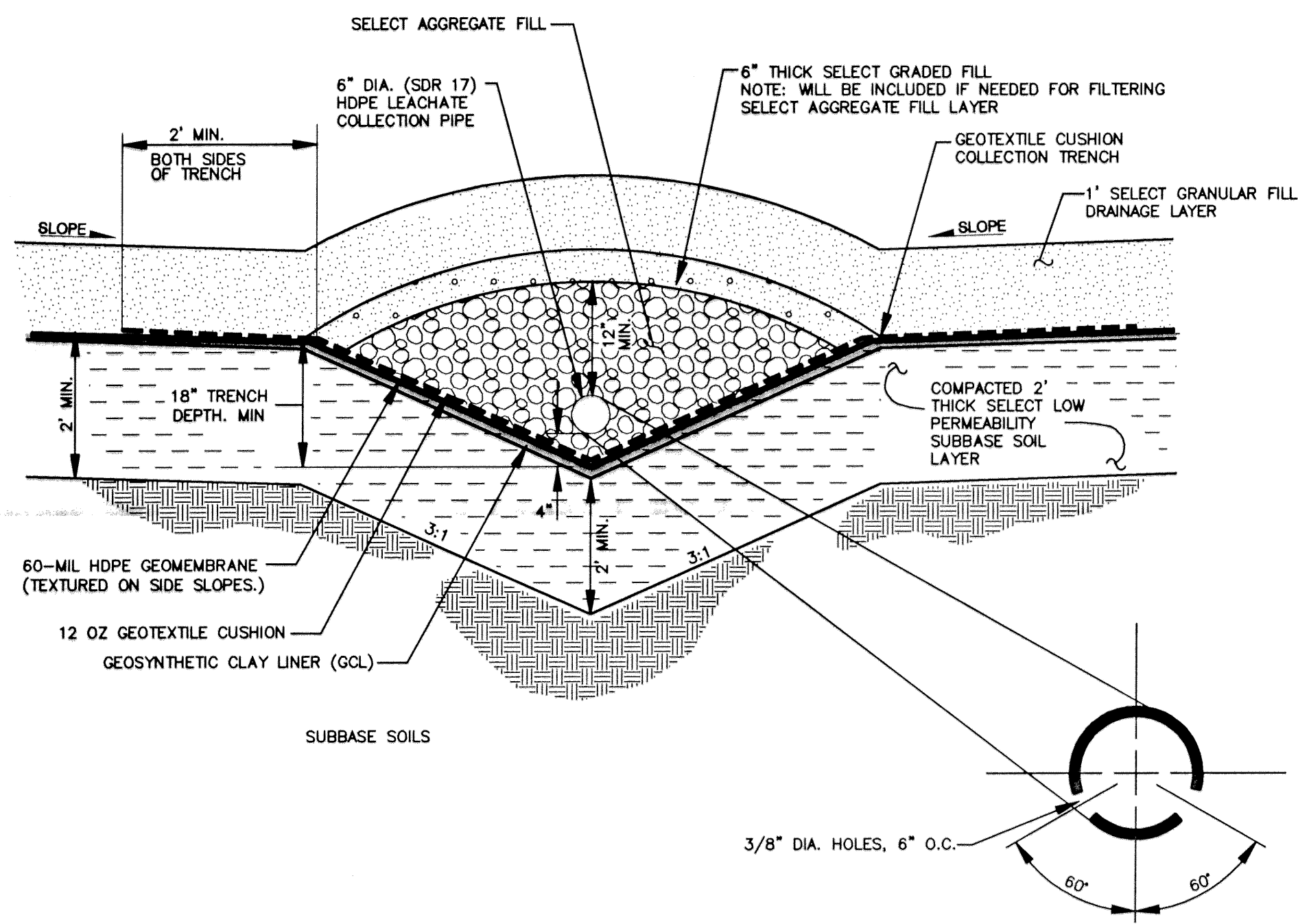


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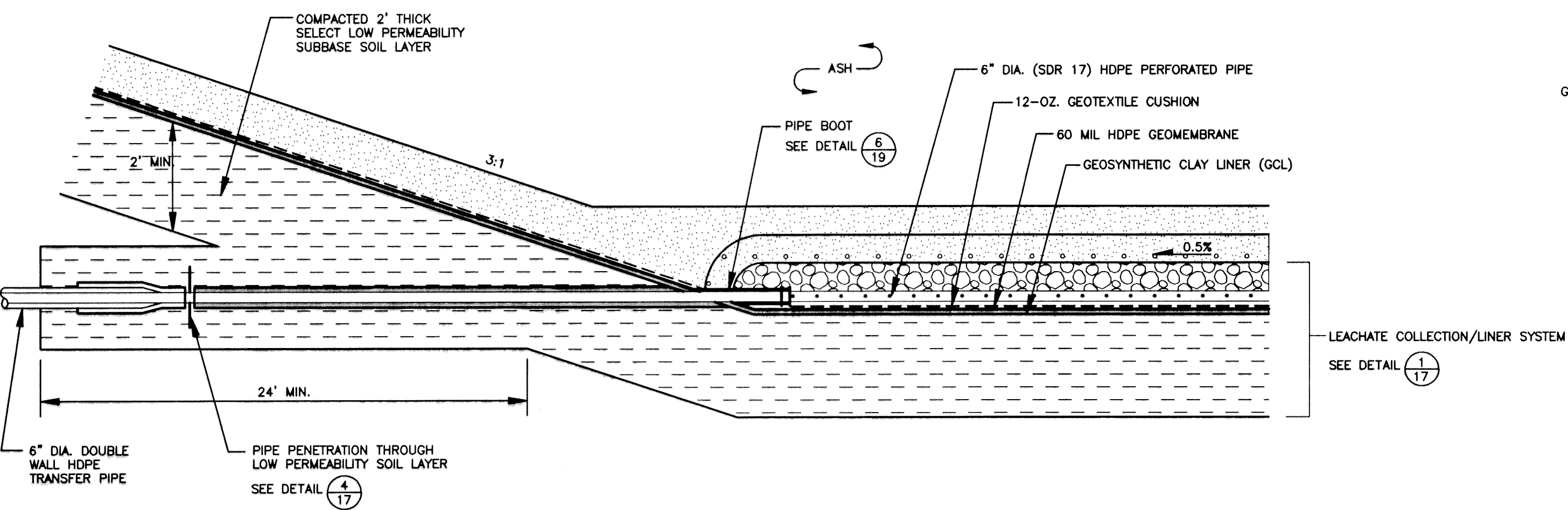


CROSS SECTION LOCATOR MAP

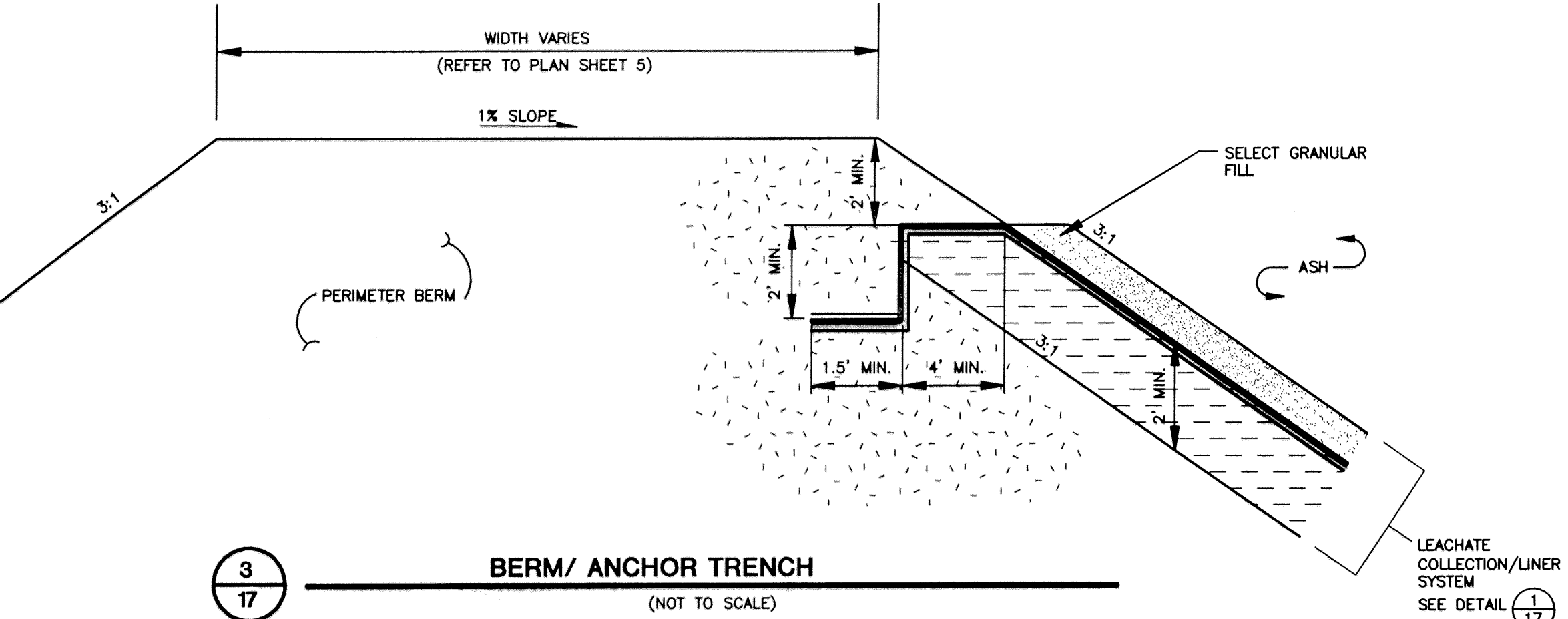
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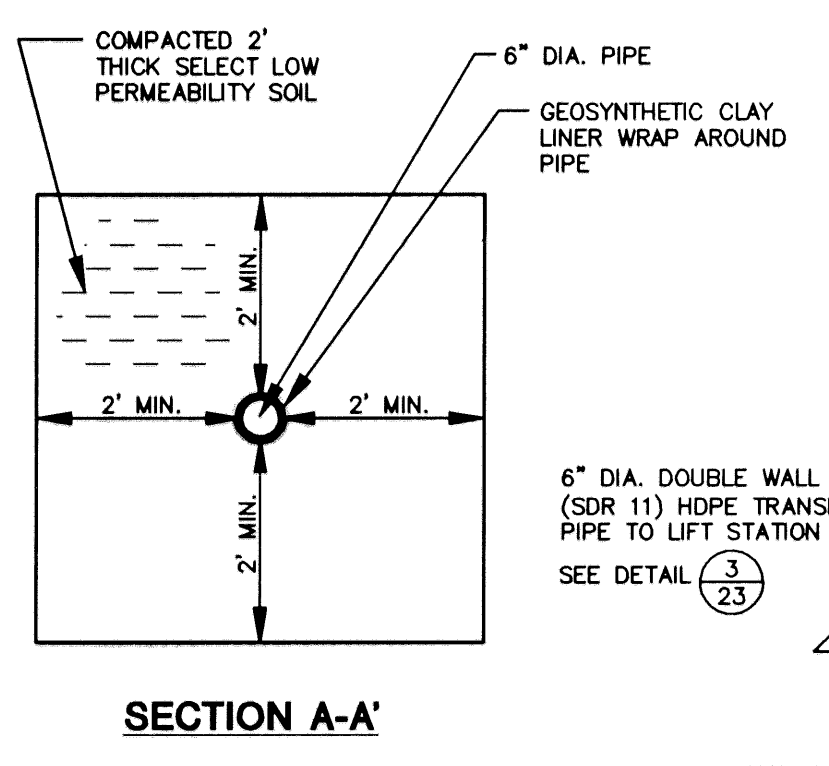
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LEACHATE COLLECTION/LINER SYSTEM
(NOT TO SCALE)



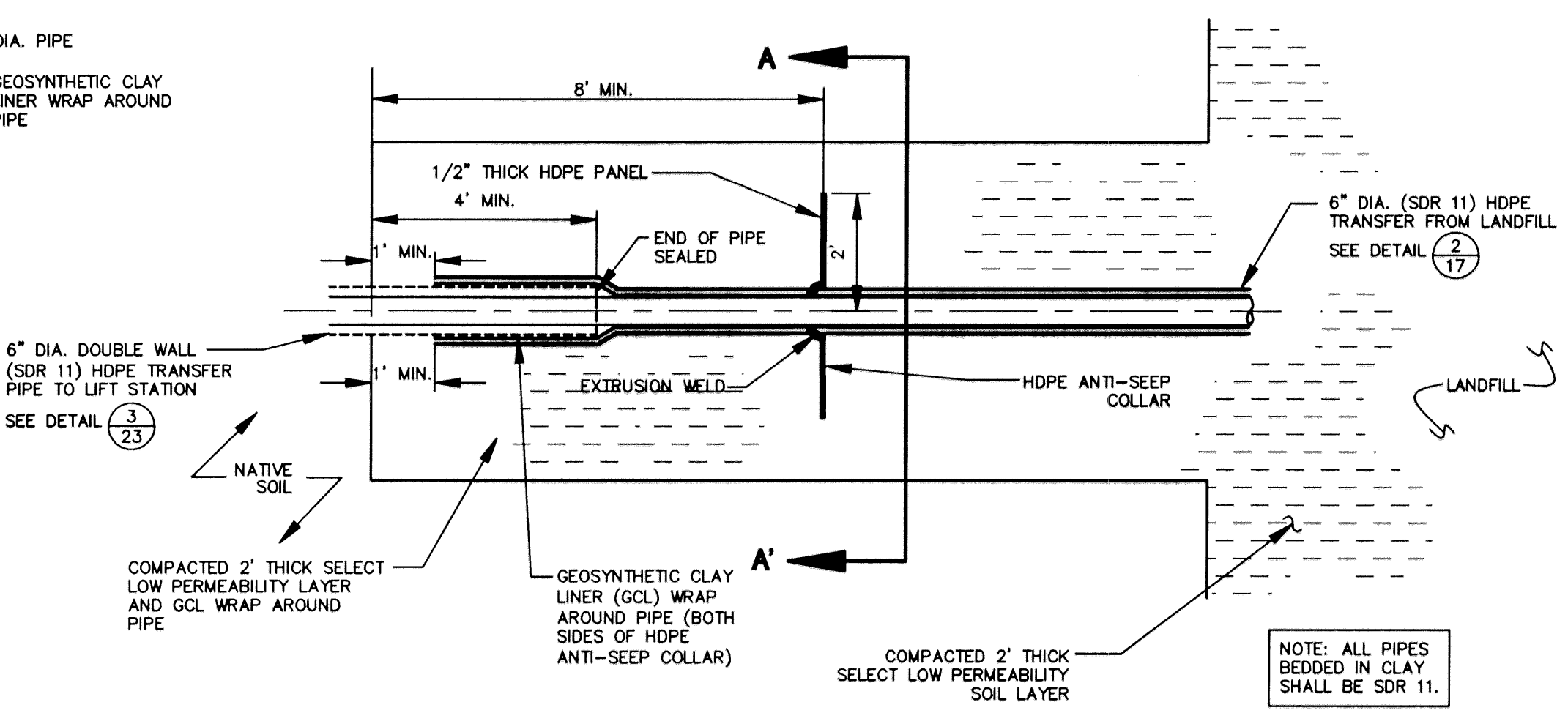
2
PIPE PENETRATION THROUGH LANDFILL PERIMETER BERM (TYPICAL)
(NOT TO SCALE) LOOKING EAST



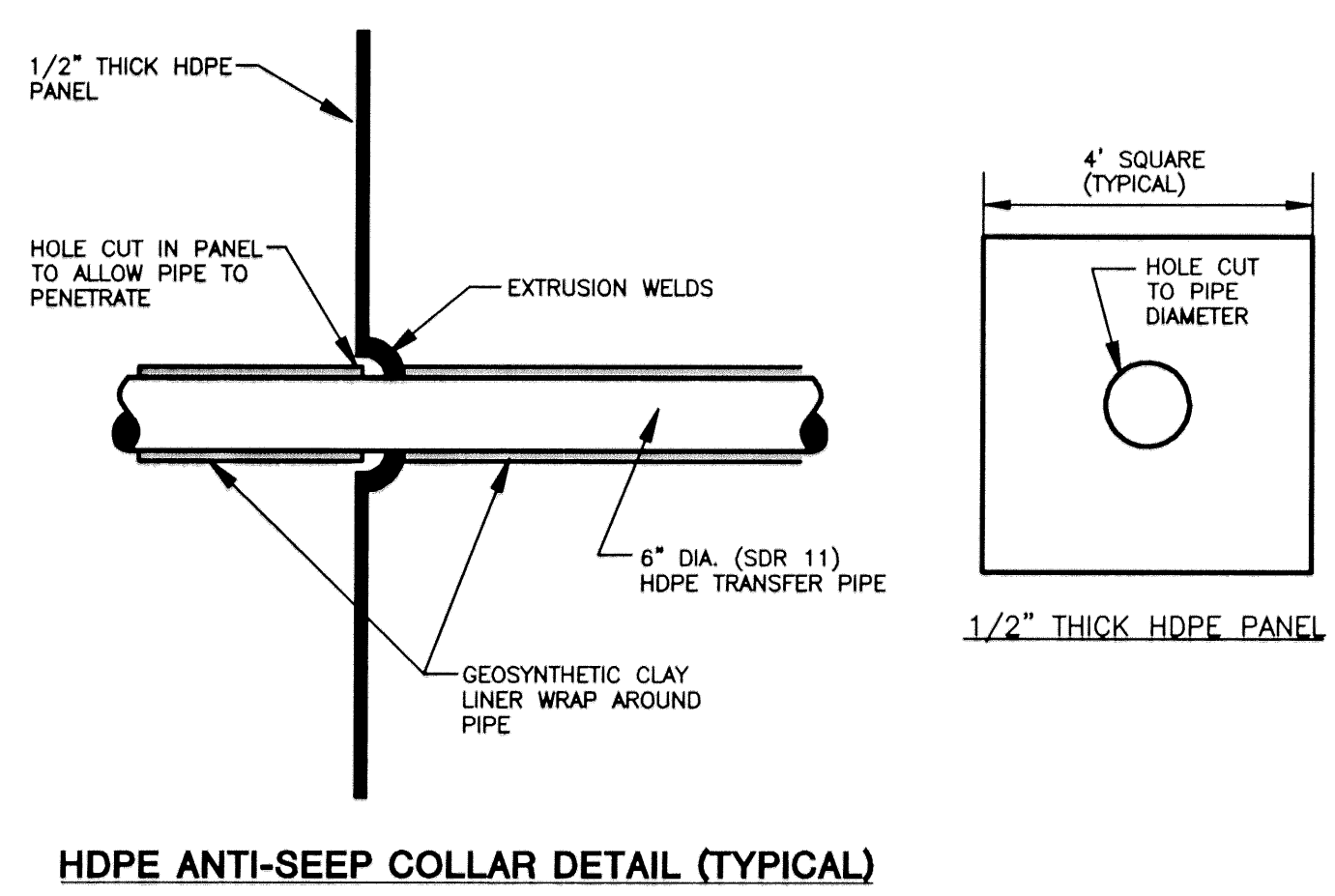
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BERM/ ANCHOR TRENCH
(NOT TO SCALE)



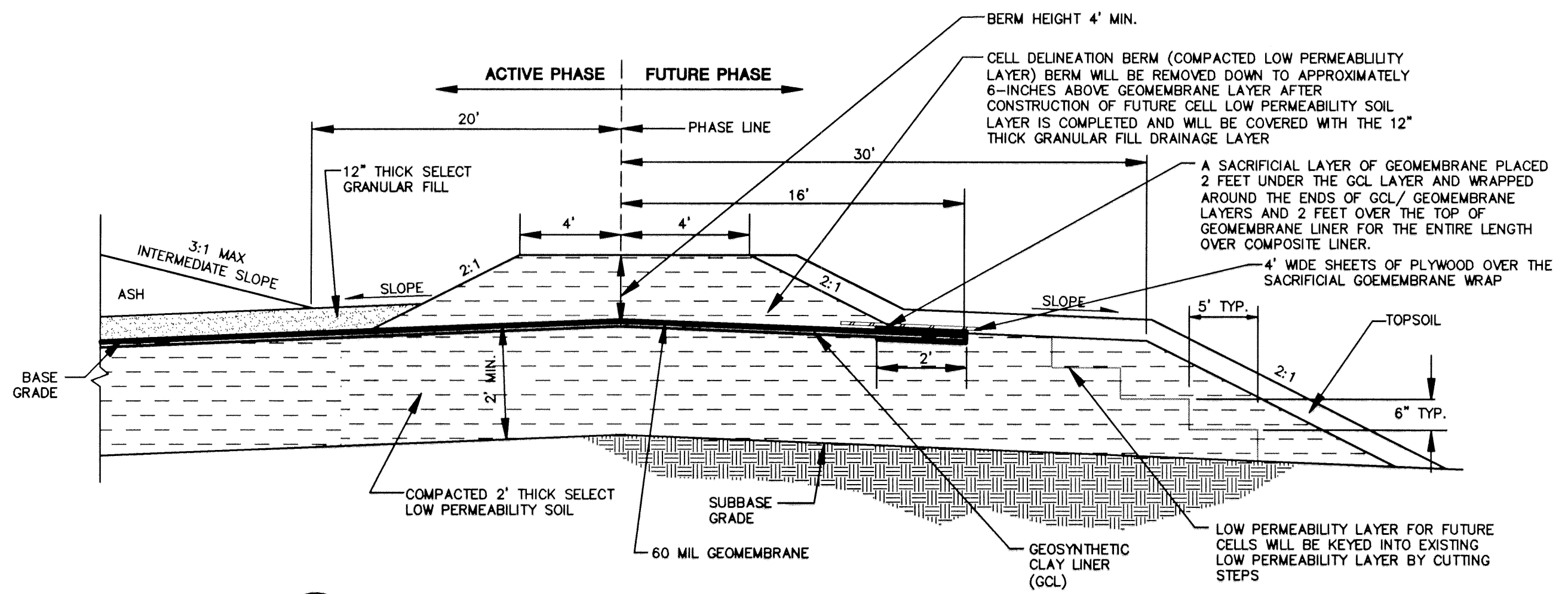
SECTION A-A'



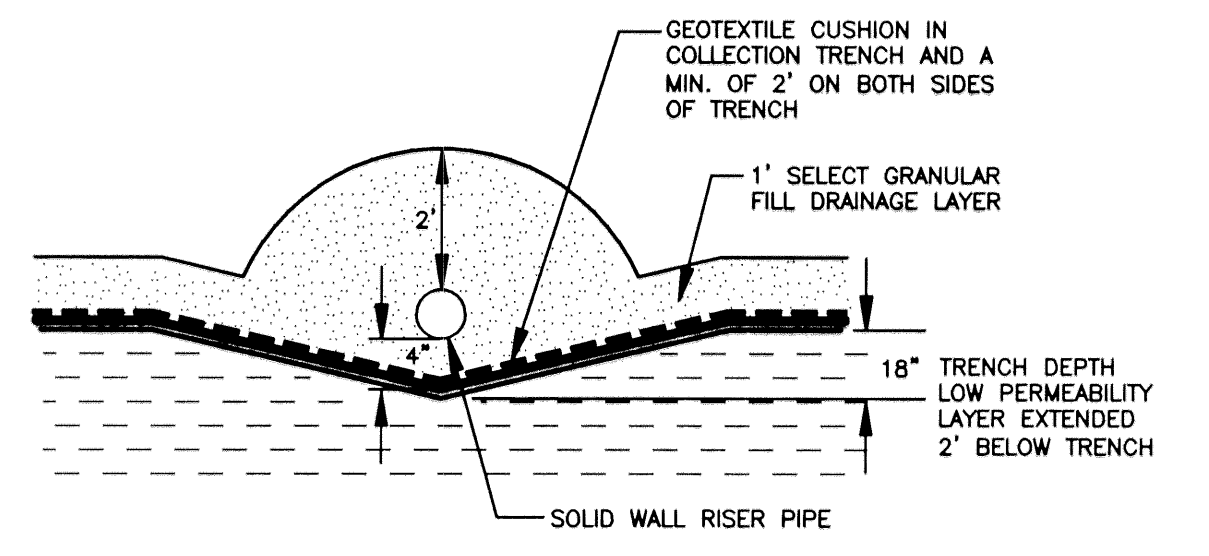
4
LEACHATE TRANSFER PIPE TRENCH CUT-OFF THROUGH PERIMETER BERM (TYPICAL)
(NOT TO SCALE)



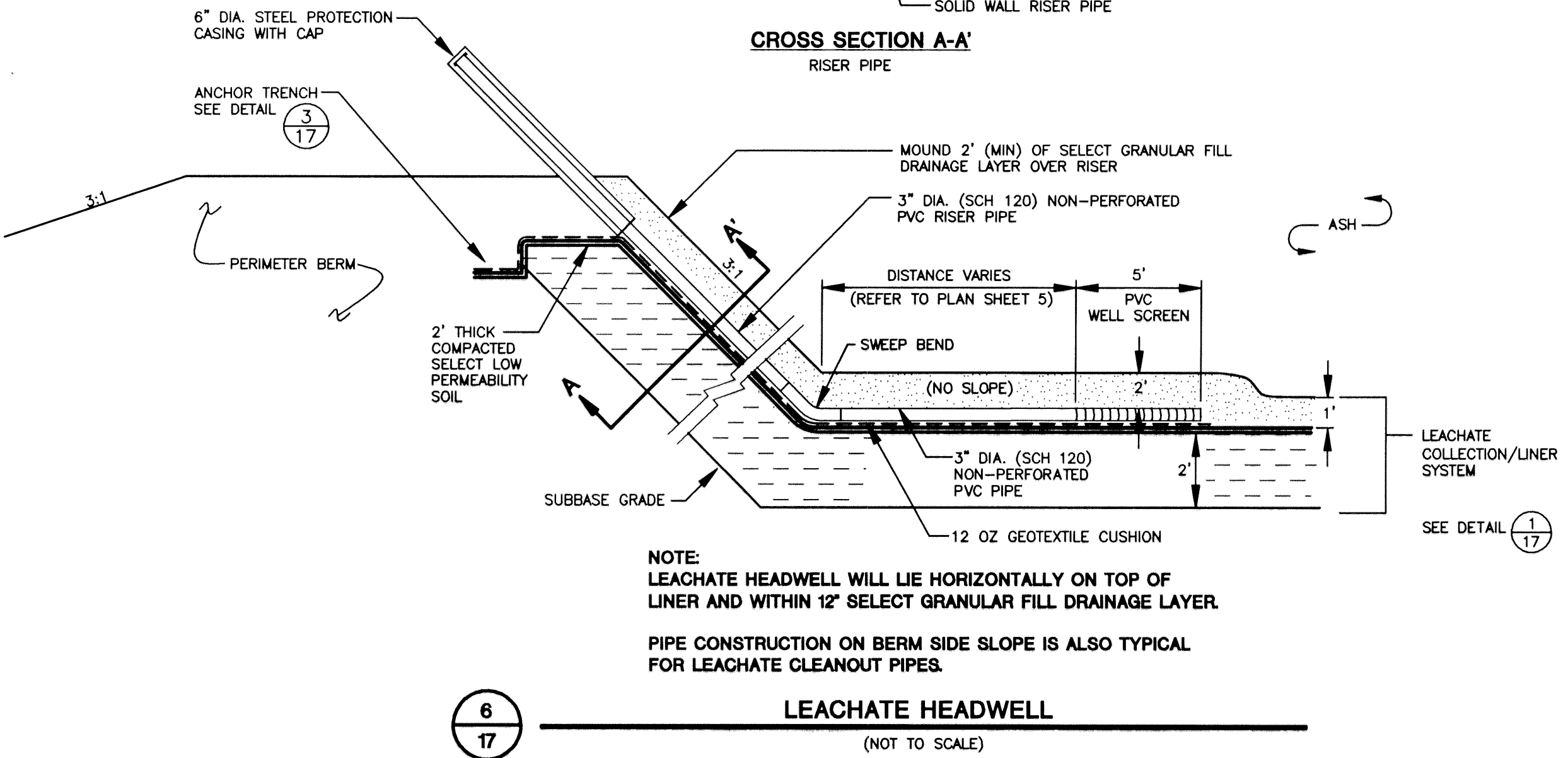
HDPE ANTI-SEEP COLLAR DETAIL (TYPICAL)



5
CELL DELINEATION BERM
(NOT TO SCALE)



CROSS SECTION A-A'
RISER PIPE



6
LEACHATE HEADWELL
(NOT TO SCALE)

LINE AND SHADING LEGEND	
	GEOTEXTILE
	GEOMEMBRANE
	GEOCOMPOSITE
	GEOSYNTHETIC CLAY LINER (GCL)
	TOPSOIL
	NATIVE SOIL
	CONCRETE
	SELECT GRANULAR FILL DRAINAGE LAYER
	PIPE BEDDING MATERIAL
	RIPRAP
	SELECT AGGREGATE FILL
	GRAVEL
	COMPACTED SELECT LOW PERMEABILITY SOIL
	GENERAL FILL

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NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT: DAIRYLAND POWER COOPERATIVE
PLAN OF OPERATION
BUFFALO COUNTY, WISCONSIN

SHEET TITLE:
DETAILS- LINER AND COLLECTION PIPES

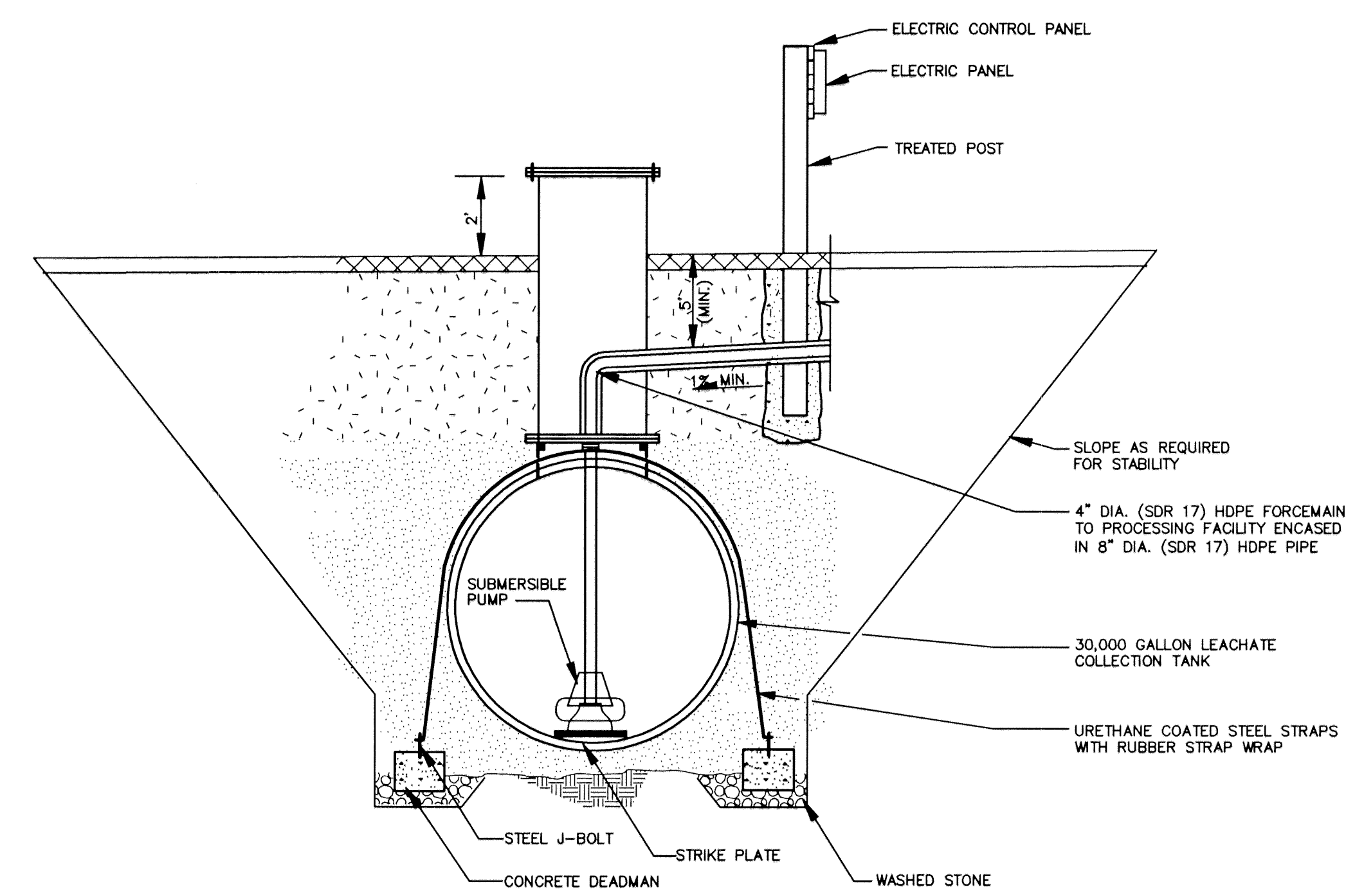
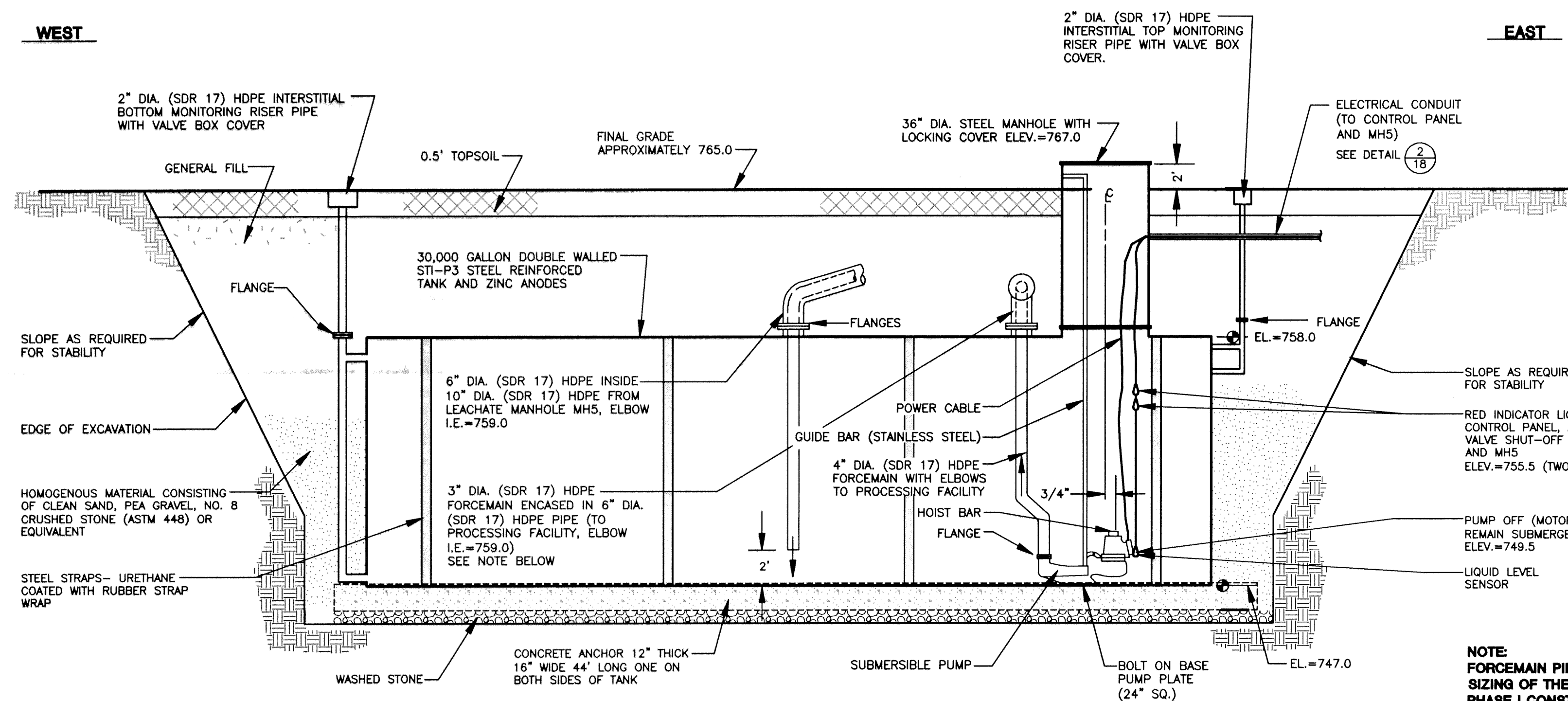
DRAWN BY: DEFOEJ	SCALE: NOT TO SCALE	PROJ. NO. 3081.40
CHECKED BY: DM	DATE PRINTED:	FILE NO. 30814005.DWG
APPROVED BY: BJK		SHEET 17 OF 23
DATE: OCTOBER 2000		

RMT.
744 Heartland Trail
Madison, WI 53717-1934
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608/831-4444

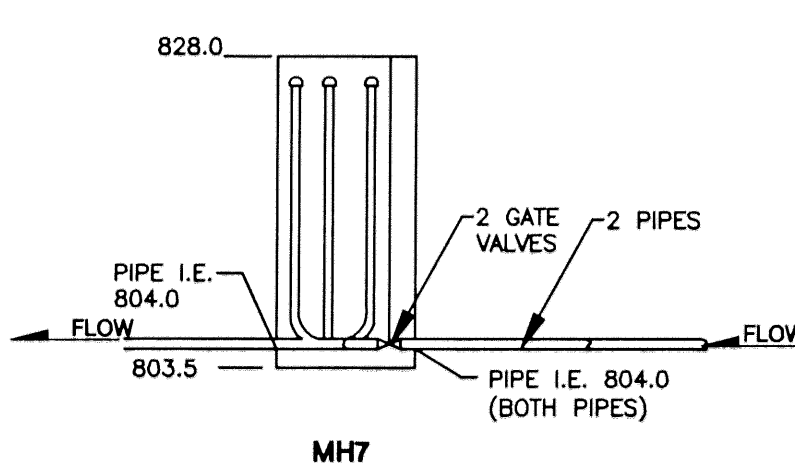
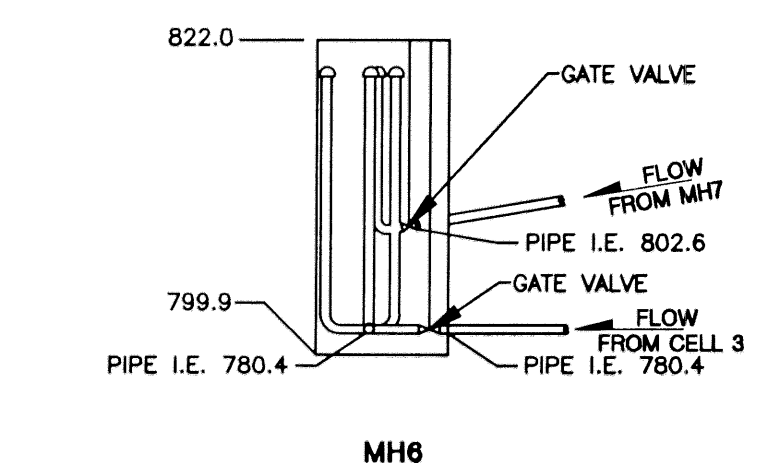
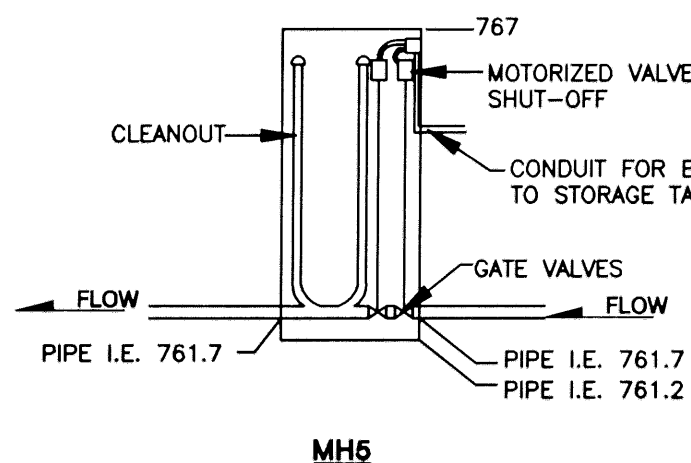
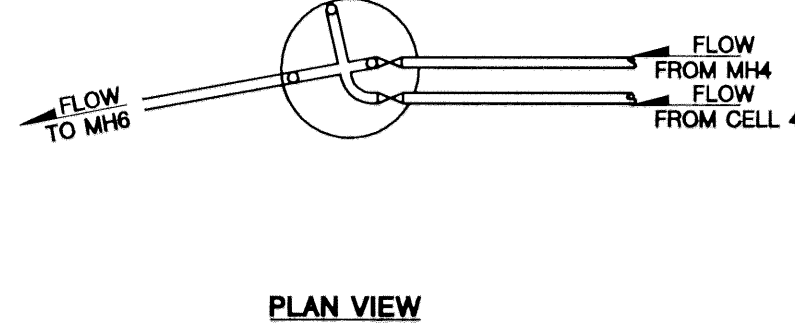
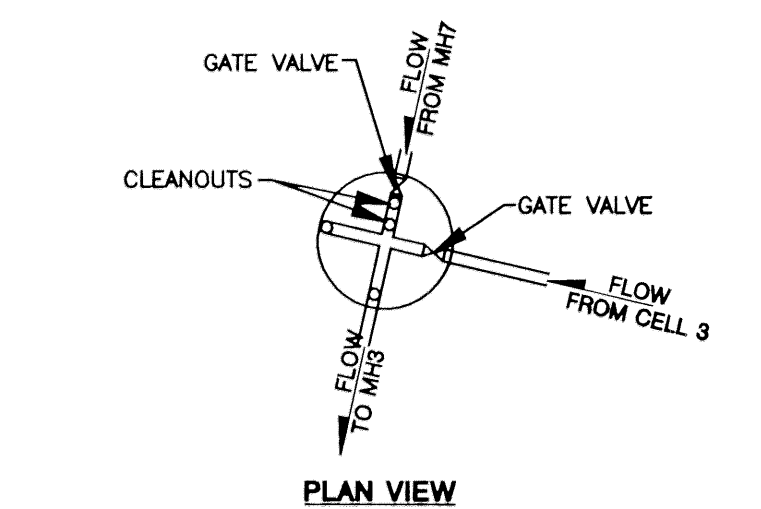
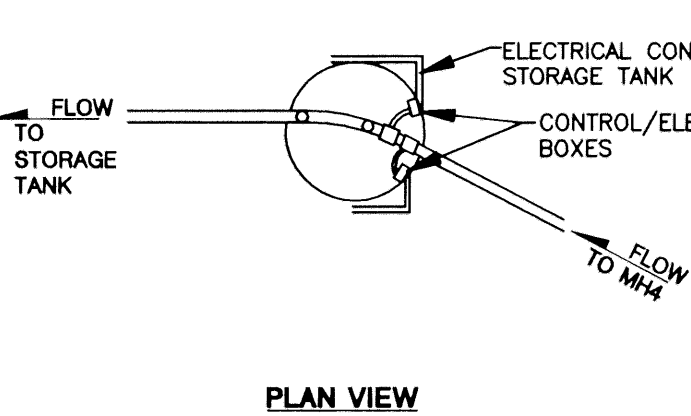
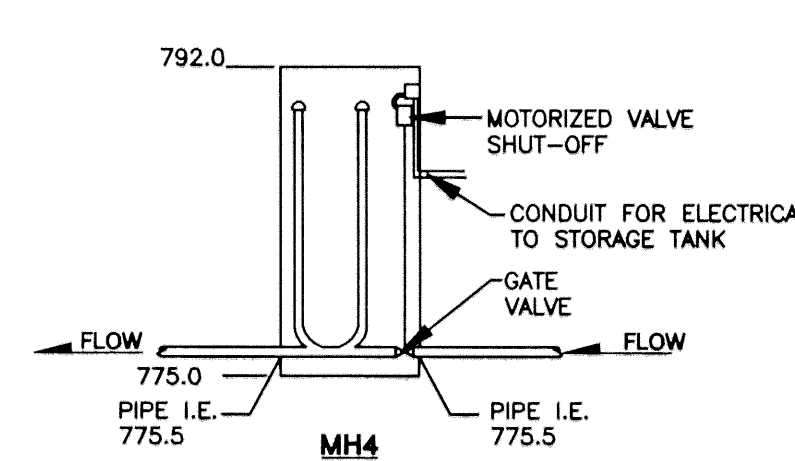
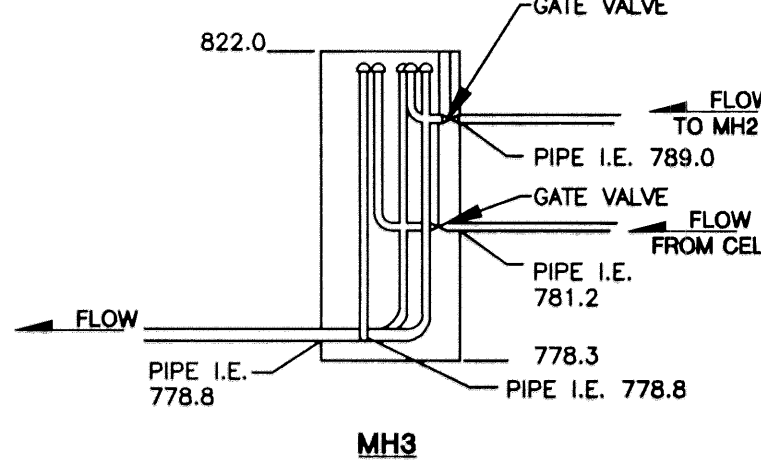
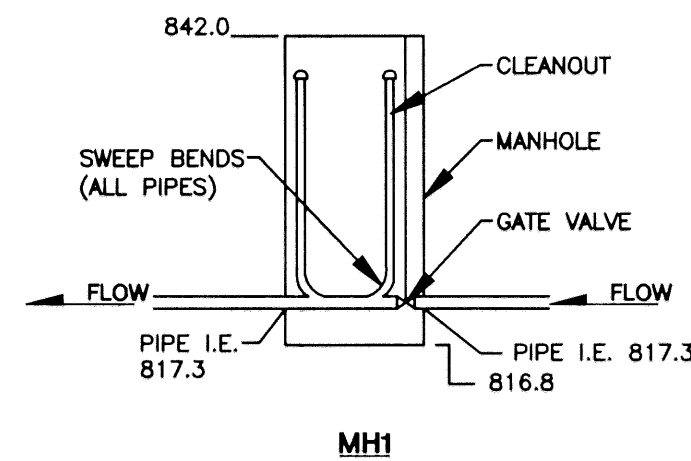
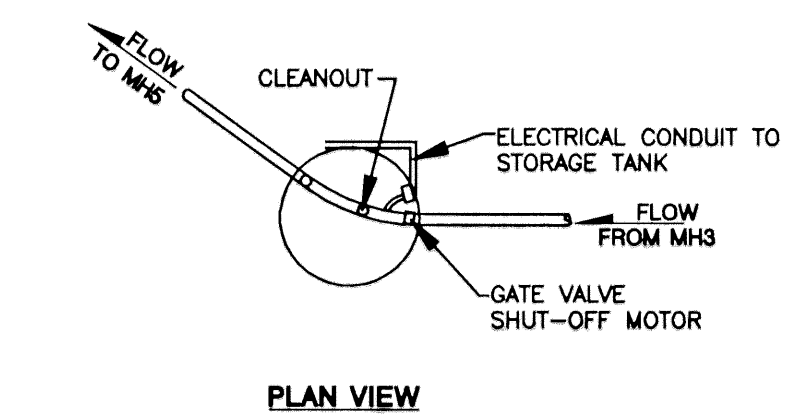
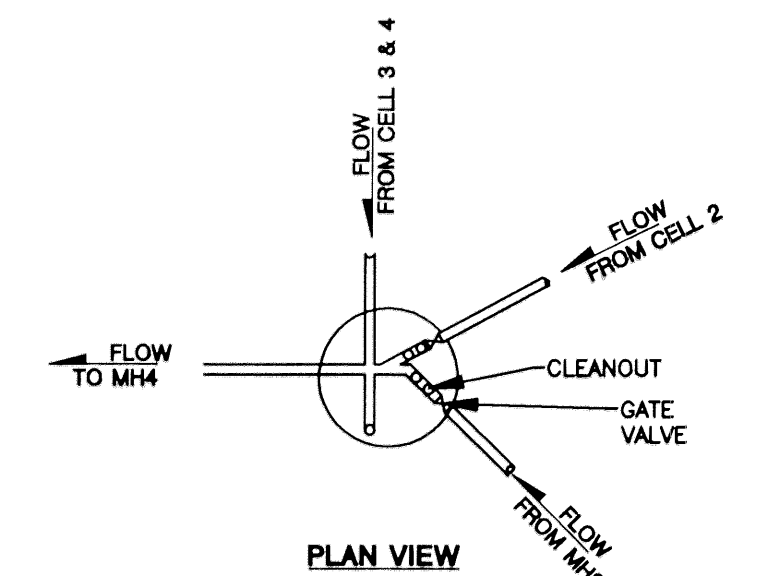
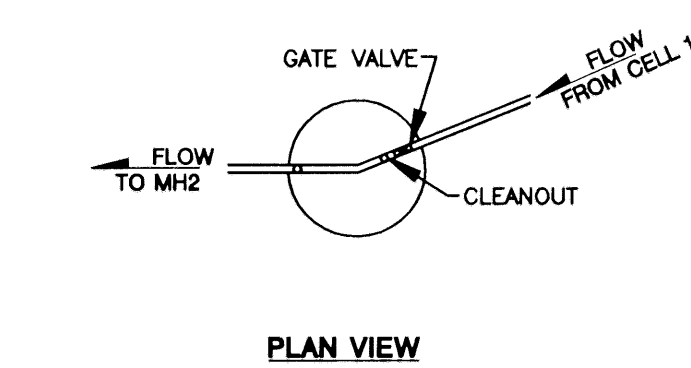
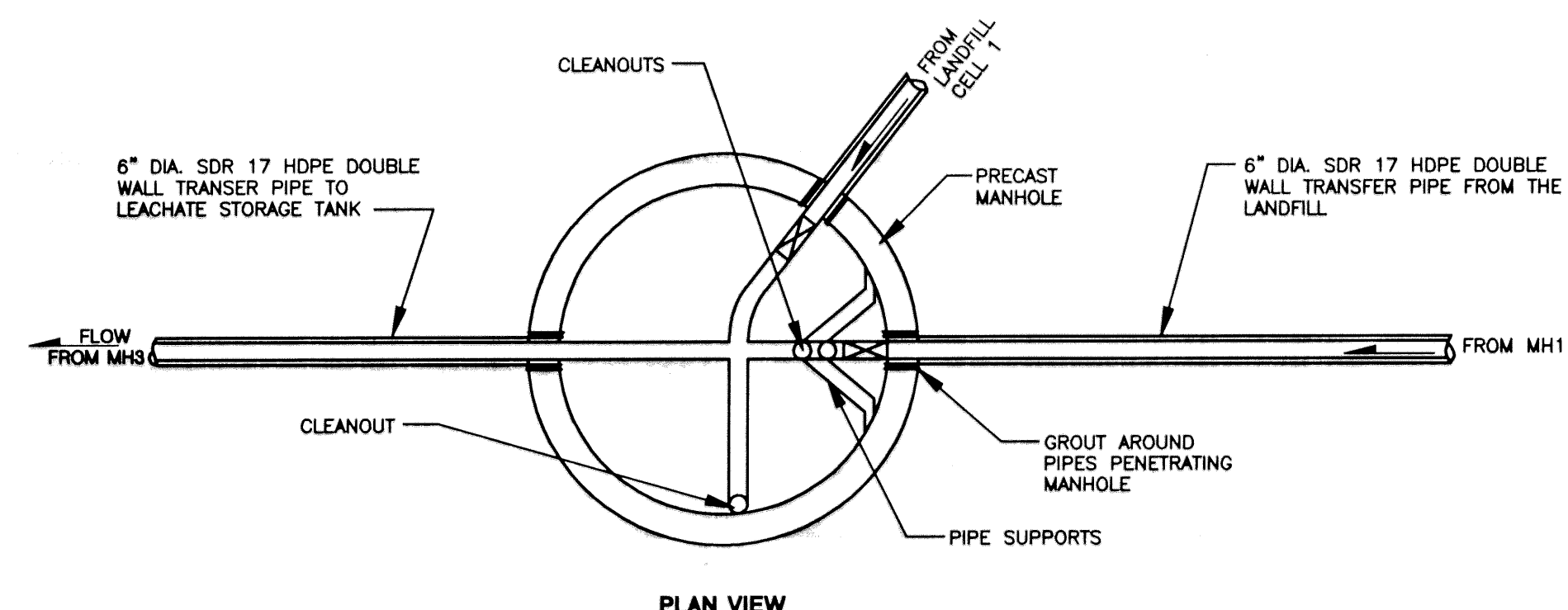
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WEST

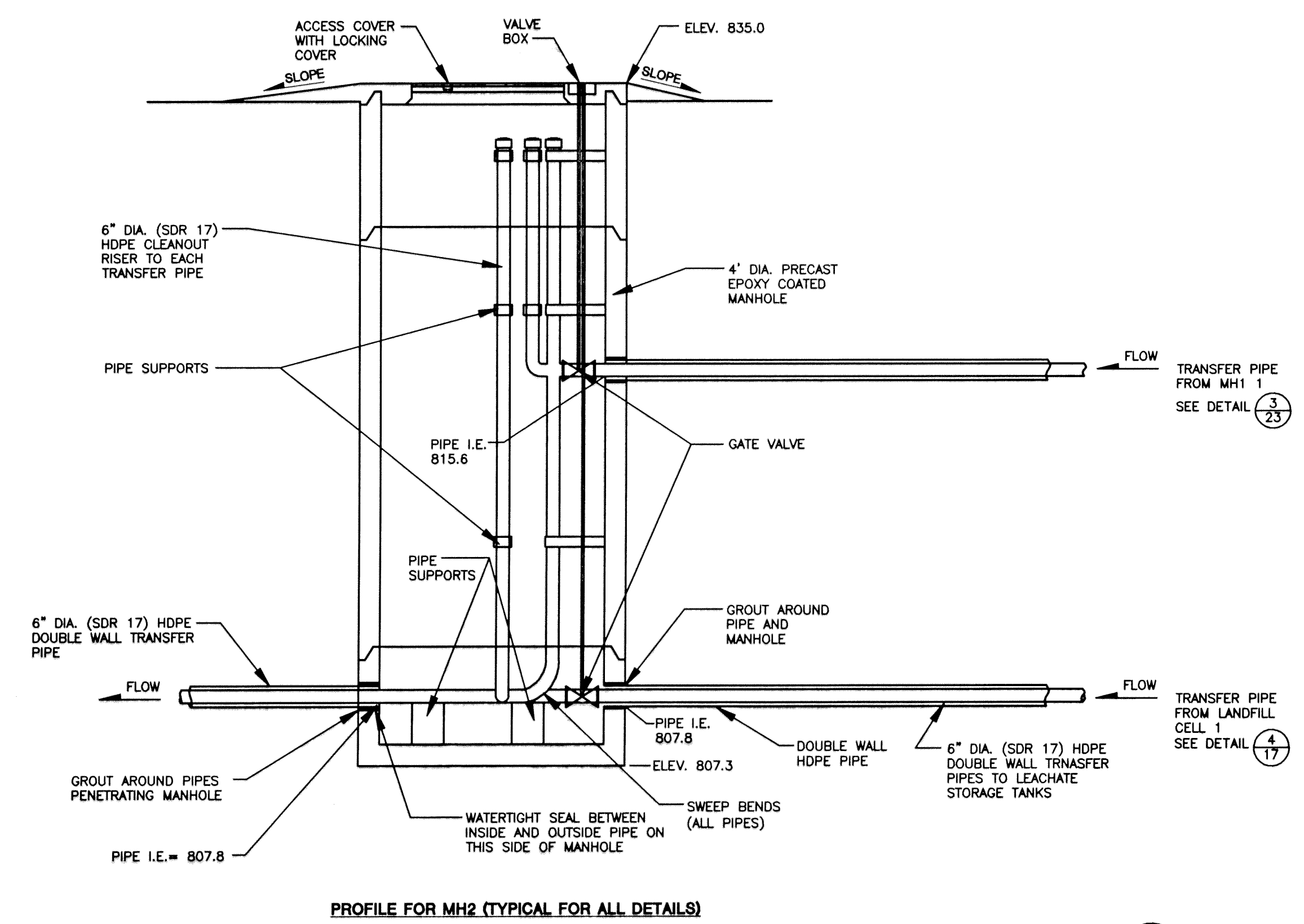
EAST



1
18
LEACHATE STORAGE TANK SECTION
(NOT TO SCALE)



2
18
MANHOLE DETAILS
(NOT TO SCALE)



LINE AND SHADING LEGEND

--- GEOTEXTILE	— GEOMEMBRANE
--- GEOCOMPOSITE	--- GEOSYNTHETIC CLAY LINER (GCL)
--- TOPSOIL	--- NATIVE SOIL
--- SELECT GRANULAR FILL DRAINAGE LAYER	--- CONCRETE
--- PIPE BEDDING MATERIAL	--- RIPRAP
--- SELECT AGGREGATE FILL	--- GRAVEL
--- COMPACTED SELECT LOW PERMEABILITY SOIL	--- GENERAL FILL

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3.				
2.				
1.				
NO.	BY	DATE	REVISION	APP'D.

PROJECT: DAIRYLAND POWER COOPERATIVE
PLAN OF OPERATION
BUFFALO COUNTY, WISCONSIN

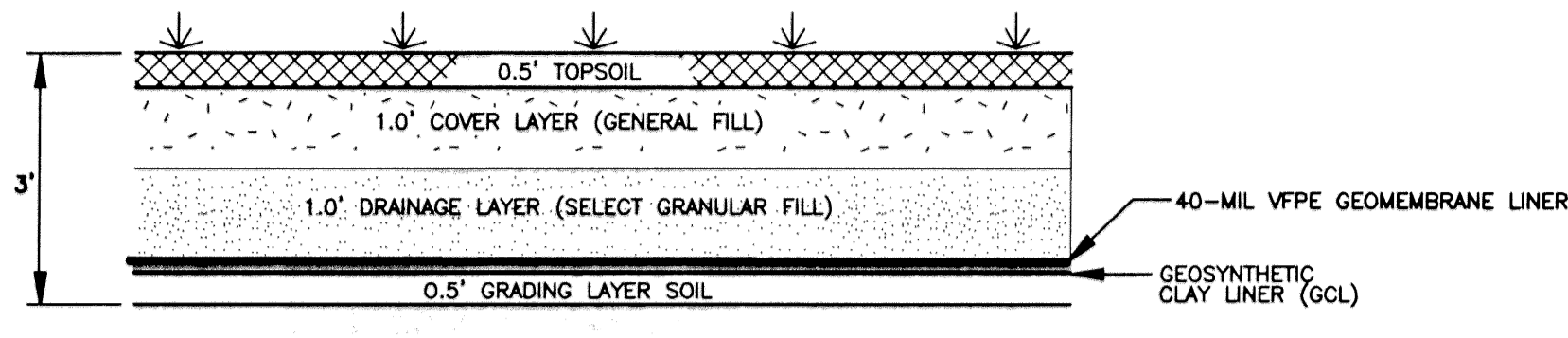
SHEET TITLE:
DETAILS- LEACHATE STORAGE TANK AND MANHOLE

DRAWN BY: DEFOEJ	SCALE: NOT TO SCALE	PROJ. NO. 3081.40
CHECKED BY: DM	DATE PRINTED:	FILE NO. 30814006.DWG
APPROVED BY: BJK		SHEET 18 OF 23
DATE: OCTOBER 2000		

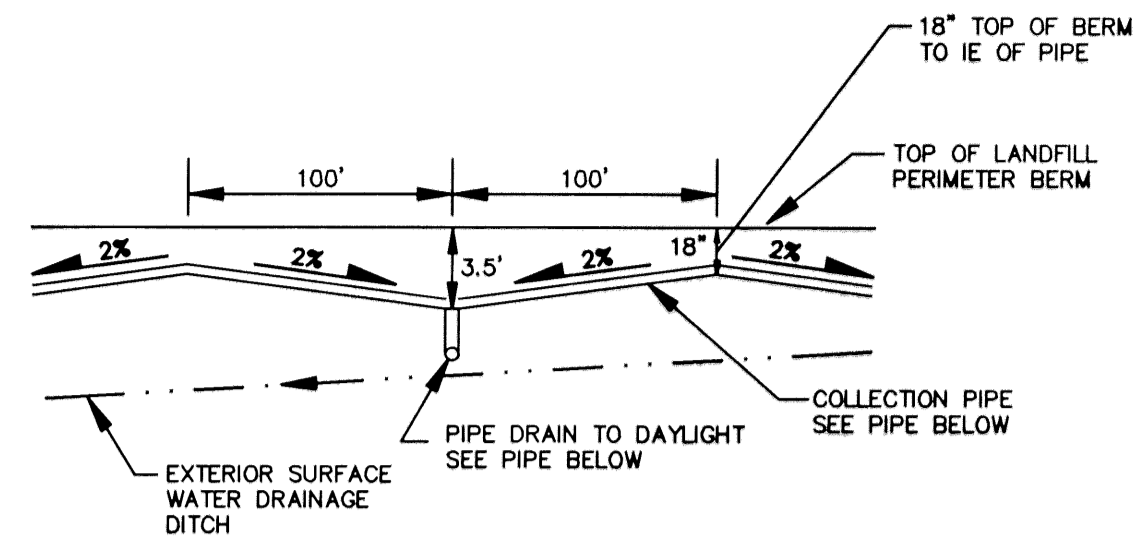
744 Heartland Trail
Madison, WI 53717-1934
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608/831-4444

RMT

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Revision: 10/000000
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Plot Time: 10:11:41 AM
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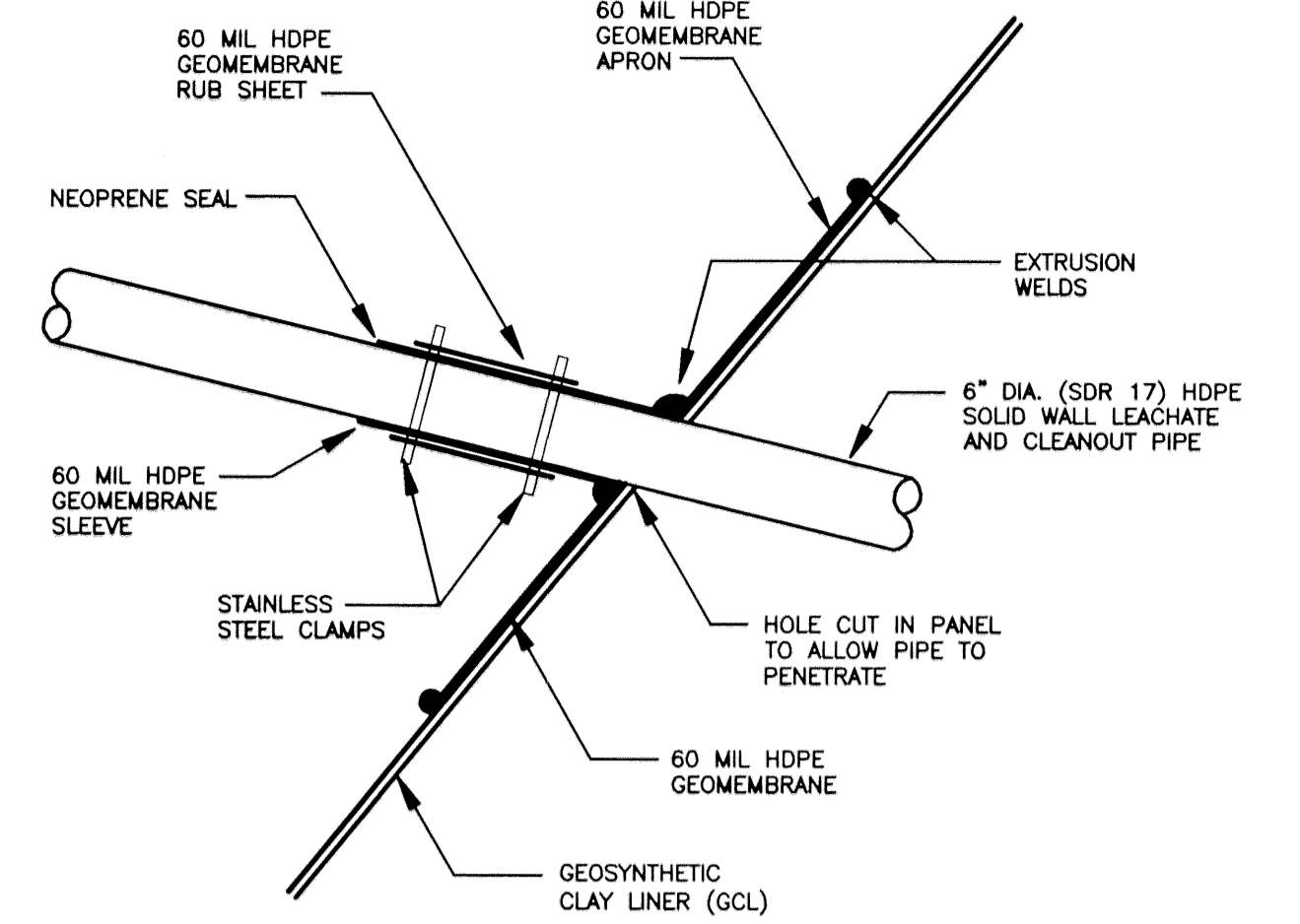


1
19 **FINAL COVER**
(NOT TO SCALE)

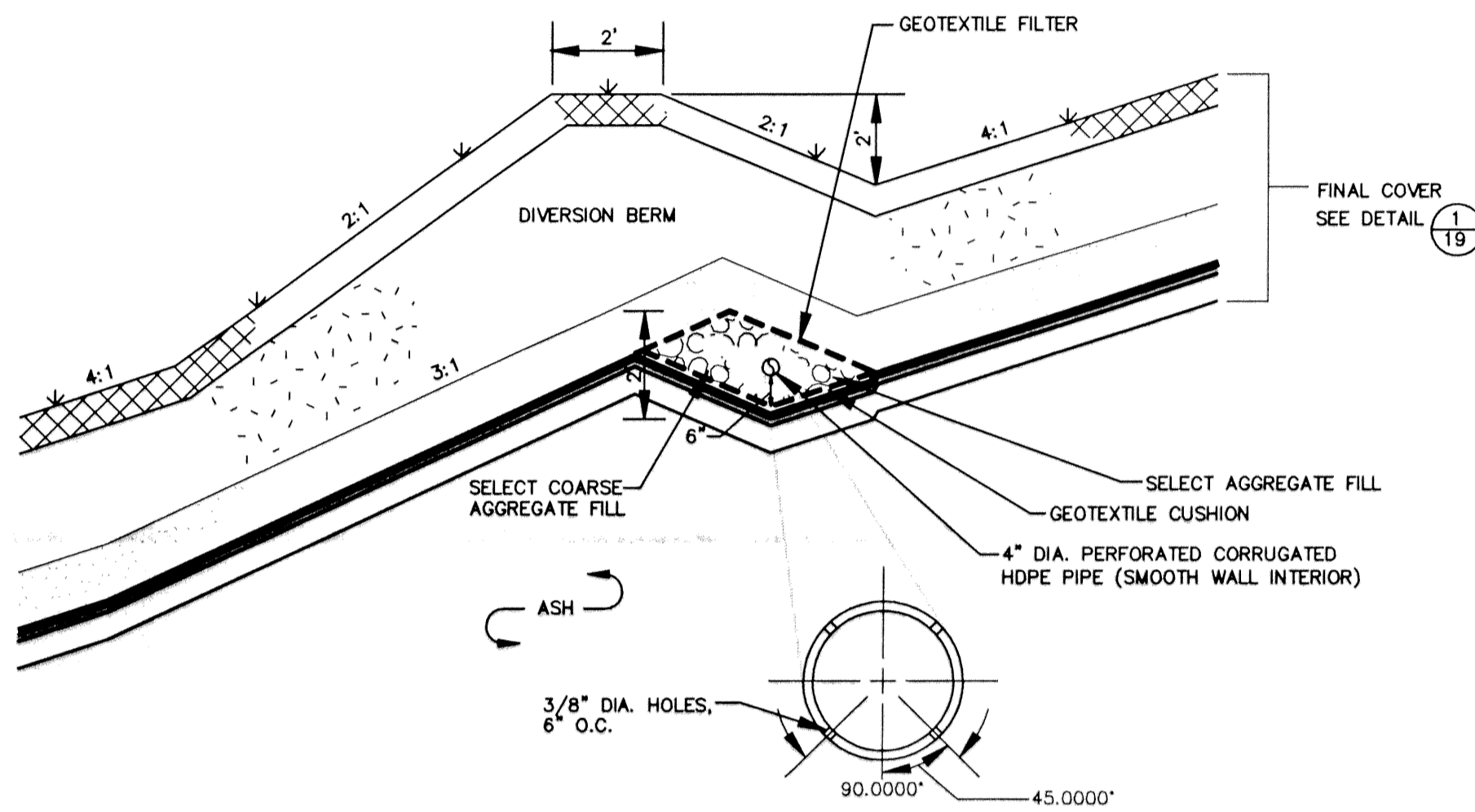


NOTE: IN AREAS WHERE THE TOP OF BERM SLOPES, THE COLLECTION PIPE WILL FOLLOW THE SAME SLOPE AS THE TOP OF BERM AND WILL OUTLET THROUGH DISCHARGE PIPES LOCATED AT SPECIFIED INTERVALS. REFER TO PLAN SHEET 12.

SECTION A-A' OF FINAL COVER DRAINAGE LAYER

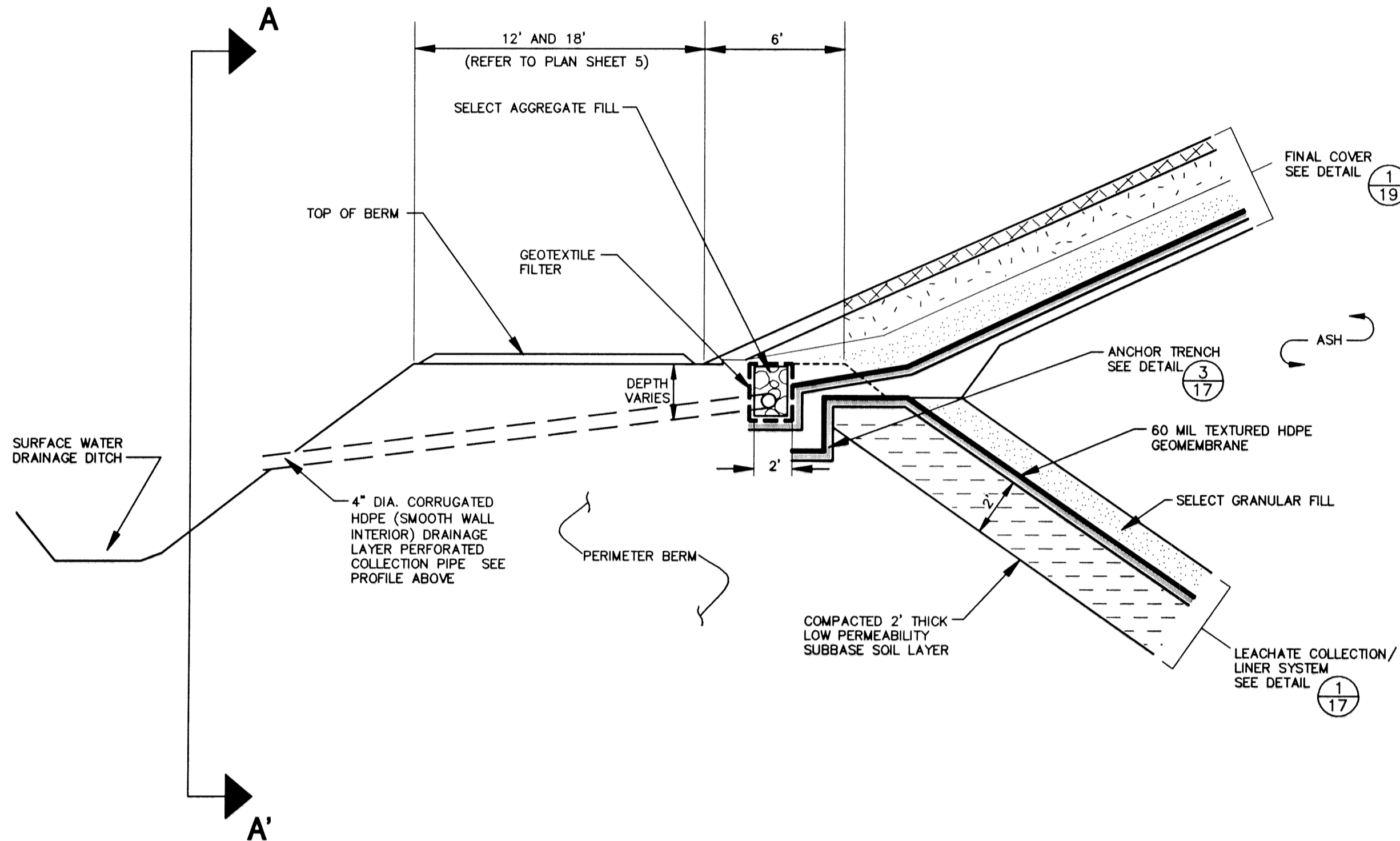


6
19 **PIPE BOOT- PIPES PENETRATING THROUGH FINAL COVER AND LOW PERMEABILITY LAYER (TYPICAL)**
(NOT TO SCALE)

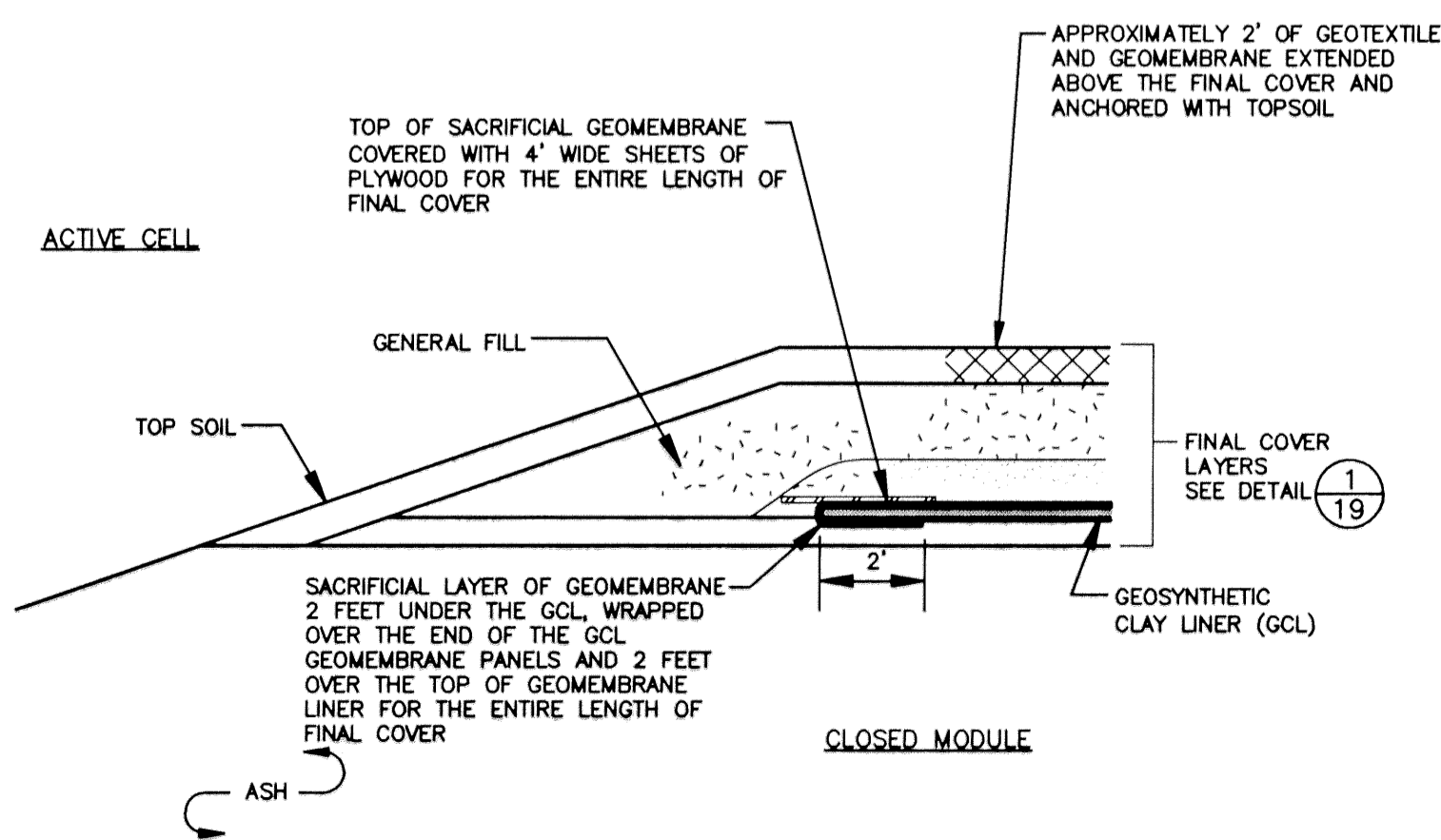


NOTE:
A 4\"/>

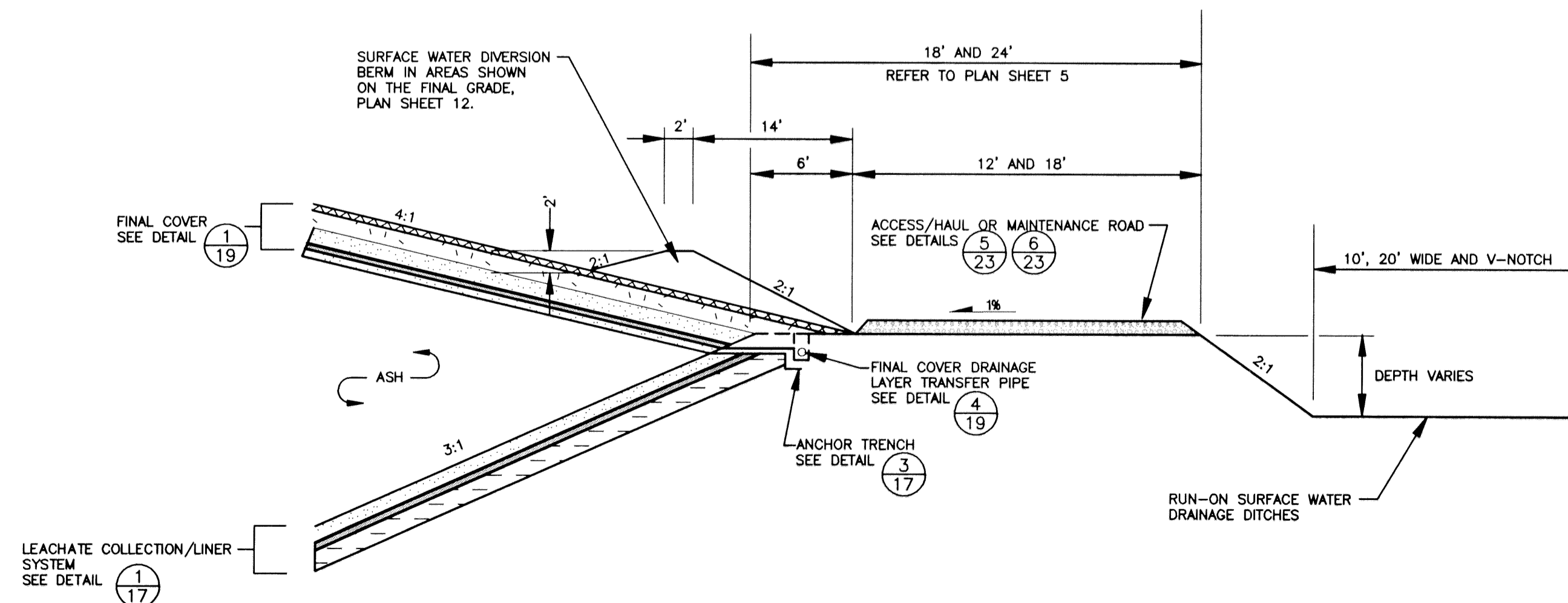
2
19 **SURFACE WATER DIVERSION BERM ON FINAL COVER (TYPICAL)**
(NOT TO SCALE)



4
19 **PERIMETER BERM FINAL COVER DRAINAGE LAYER DISCHARGE PIPE (TYPICAL)**
(NOT TO SCALE)



3
19 **CONSTRUCTION OF FINAL COVER FOR SPLICING FUTURE FINAL COVER**
(NOT TO SCALE)



5
19 **LANDFILL PERIMETER BERM AND SURFACE WATER DRAINAGE DITCHES (TYPICAL)**
(NOT TO SCALE)

LINE AND SHADING LEGEND

--- GEOTEXTILE	— GEOMEMBRANE
--- GEOCOMPOSITE	--- GEOSYNTHETIC CLAY LINER (GCL)
TOPSOIL	NATIVE SOIL
SELECT GRANULAR FILL DRAINAGE LAYER	CONCRETE
PIPE BEDDING MATERIAL	RIPRAP
SELECT AGGREGATE FILL	GRAVEL
COMPACTED SELECT LOW PERMEABILITY SOIL	GENERAL FILL

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NOT FOR CONSTRUCTION

3.				
2.				
1.				
NO.	BY	DATE	REVISION	APP'D.

PROJECT: **DAIRYLAND POWER COOPERATIVE PLAN OF OPERATION BUFFALO COUNTY, WISCONSIN**

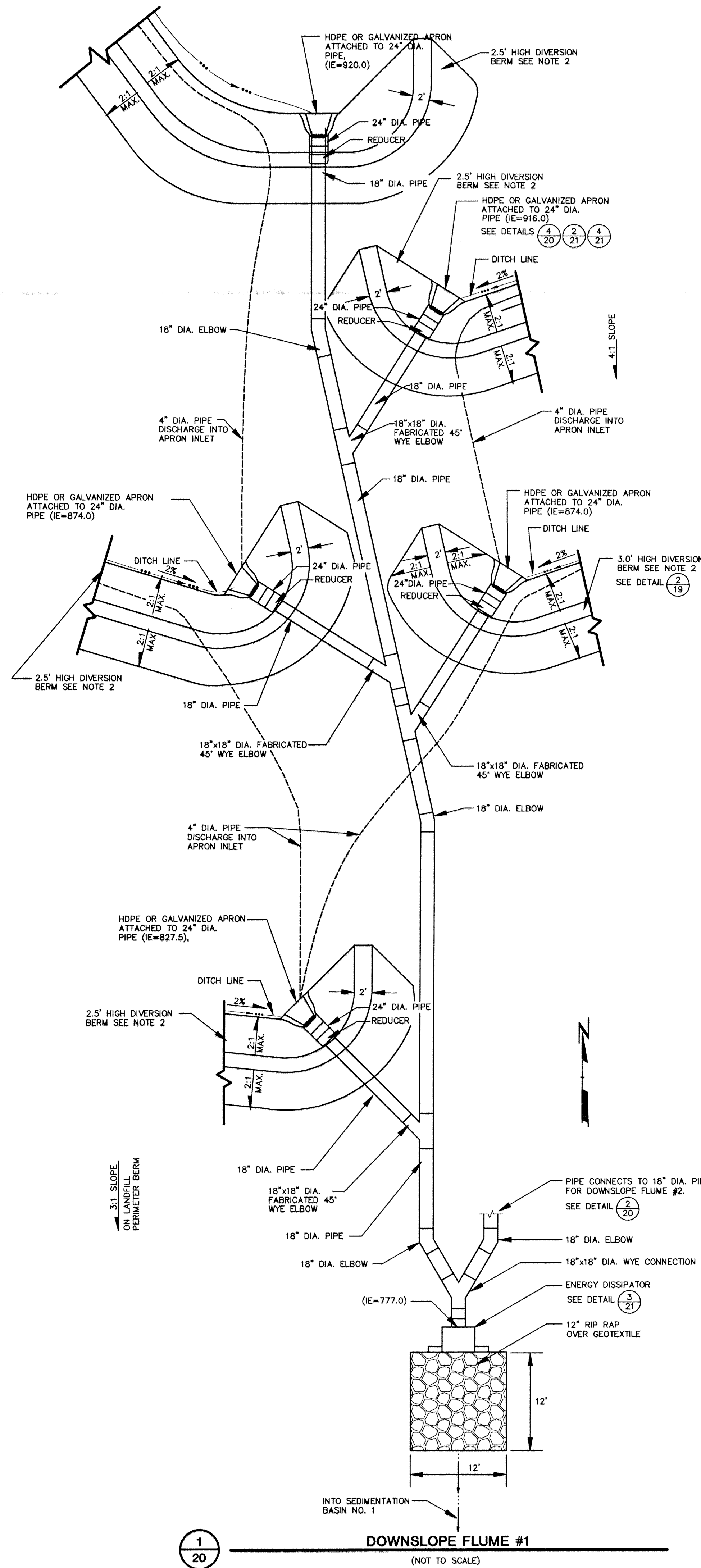
SHEET TITLE: **DETAILS- FINAL COVER**

DRAWN BY: DEFOEJ	SCALE: NOT TO SCALE	PROJ. NO. 3081.40
CHECKED BY: DM	FILE NO. 30814004.dwg	
APPROVED BY: BJK	DATE PRINTED:	SHEET 19 OF 23
DATE: OCTOBER 2000		

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NOT FOR CONSTRUCTION

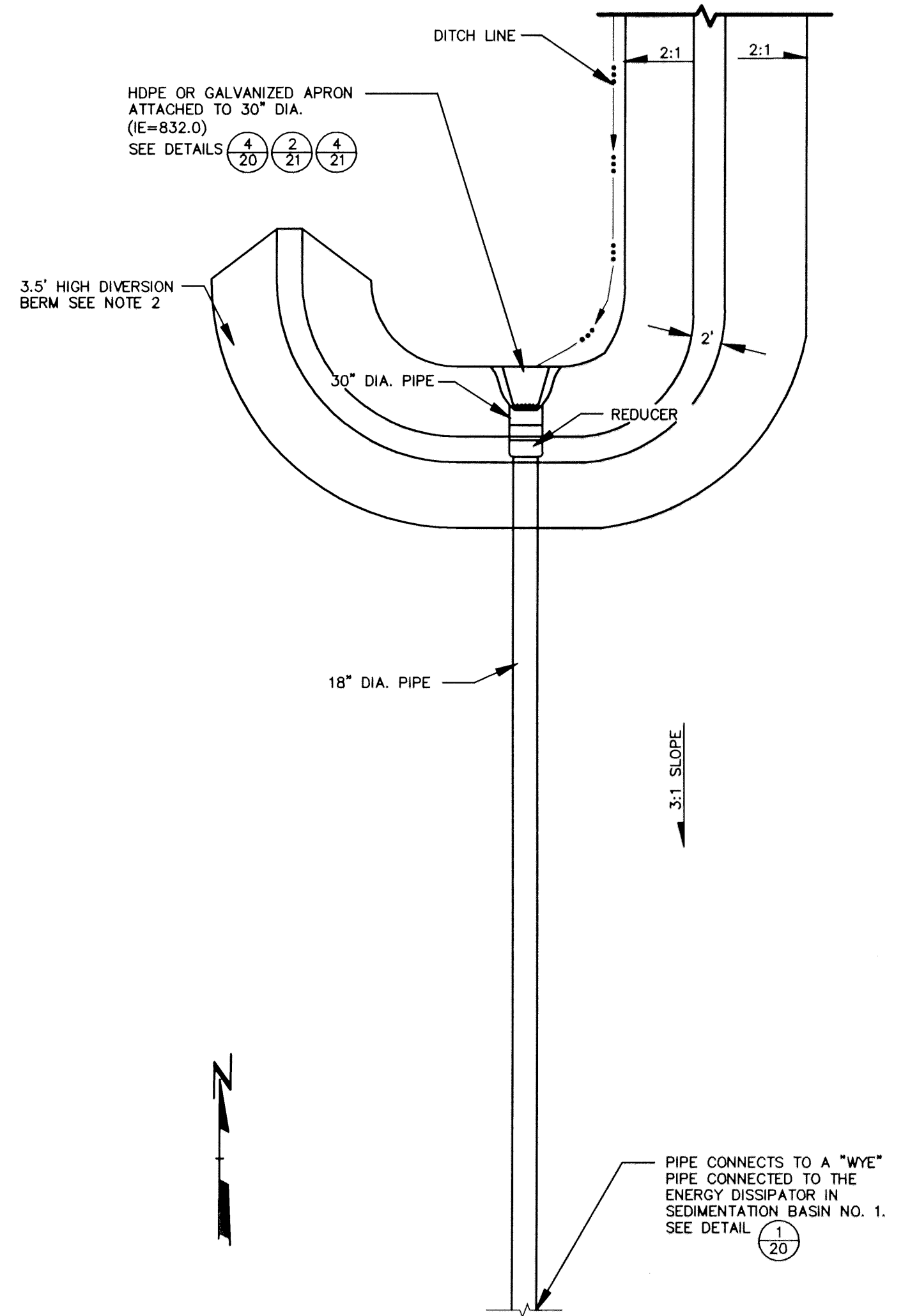
RMT
744 Heartland Trail
Madison, WI 53717-1934
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608/831-4444

RMT, Inc. 11/05/00
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 Plot Date: Tue Apr 10 16:18:54 2001
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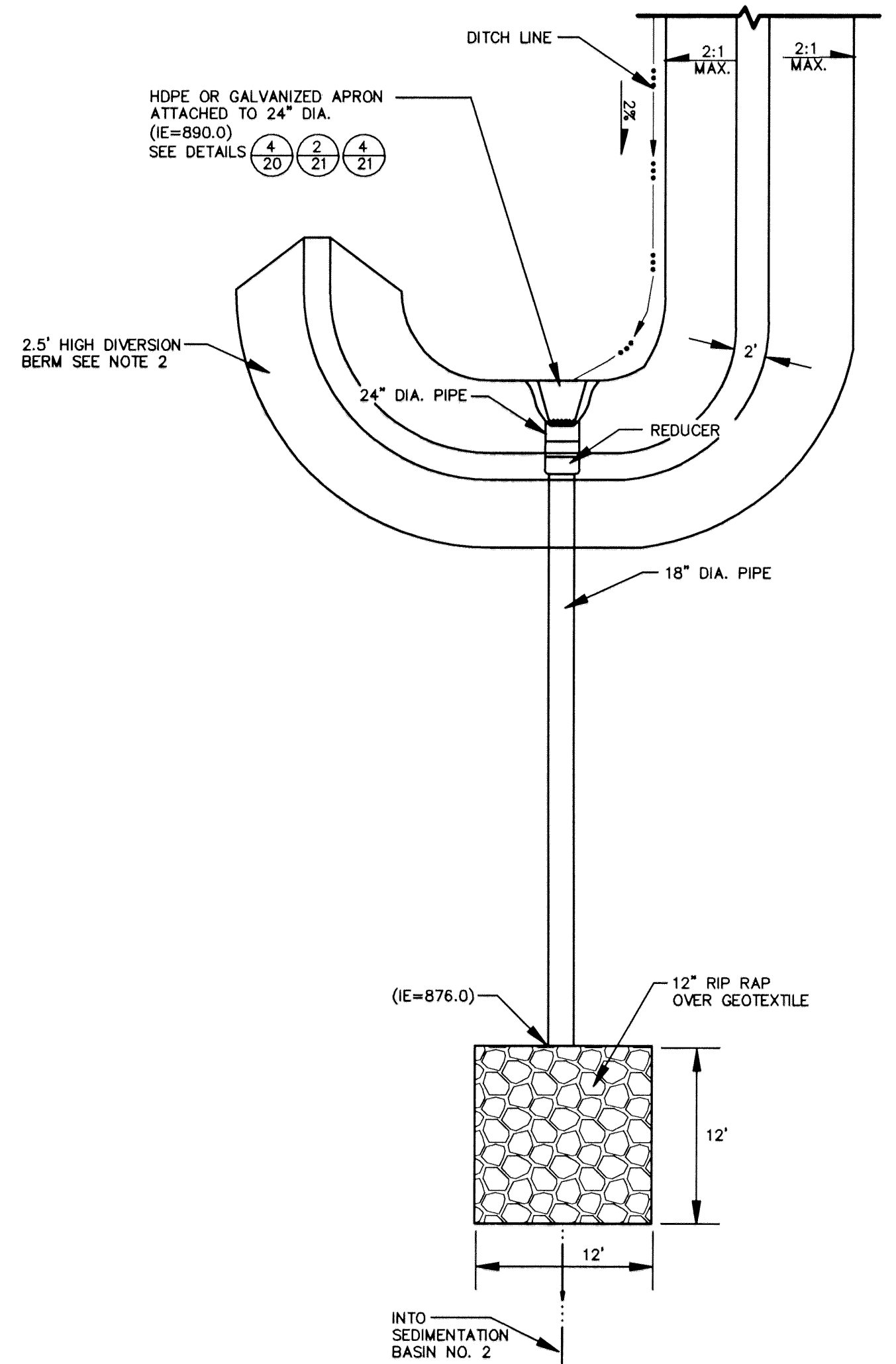
1
20

Downslope Flume #1
(NOT TO SCALE)



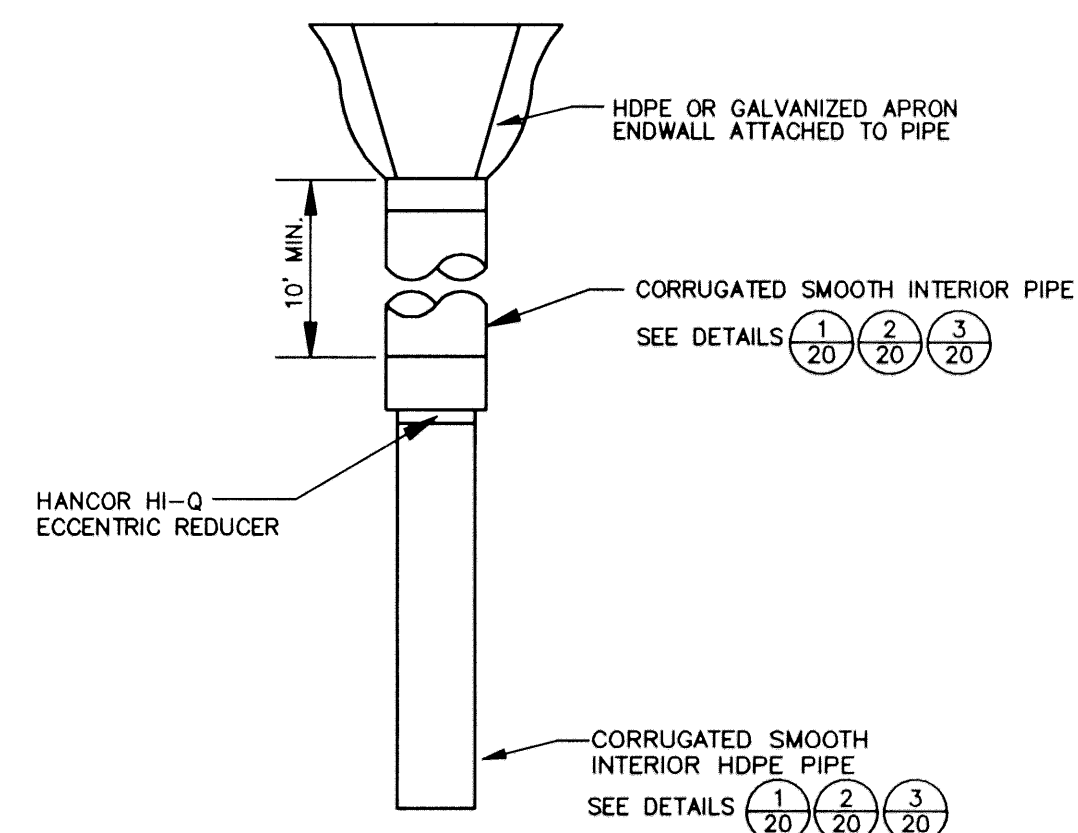
2
20

Downslope Flume #2
(NOT TO SCALE)



3
20

Downslope Flume #3
(NOT TO SCALE)



4
20

Downslope Flume Inlet Structure (Typical)
(NOT TO SCALE)

NOTES

1. ALL PIPE CONNECTORS ARE CORRUGATED SMOOTH HDPE.
2. 2.5 FOOT DIVERSION BERM AT PIPE INLET WILL TAPER TO A 2-FOOT DIVERSION BERM 50- FEET FROM PIPE INLET. 3.0 FOOT DIVERSION BERM AT PIPE INLET WILL TAPER TO A 2-FOOT DIVERSION BERM 100- FEET FROM PIPE INLET. 3.5 FOOT DIVERSION BERM AT PIPE INLET WILL TAPER TO A 2-FOOT DIVERSION BERM 150- FEET FROM PIPE INLET.

LINE AND SHADING LEGEND

--- GEOTEXTILE	--- GEOMEMBRANE
--- GEOCOMPOSITE	--- GEOSYNTHETIC CLAY LINER (GCL)
--- TOPSOIL	--- NATIVE SOIL
--- SELECT GRANULAR FILL DRAINAGE LAYER	--- CONCRETE
--- PIPE BEDDING MATERIAL	--- RIPRAP
--- SELECT AGGREGATE FILL	--- GRAVEL
--- COMPACTED SELECT LOW PERMEABILITY SOIL	--- GENERAL FILL

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NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

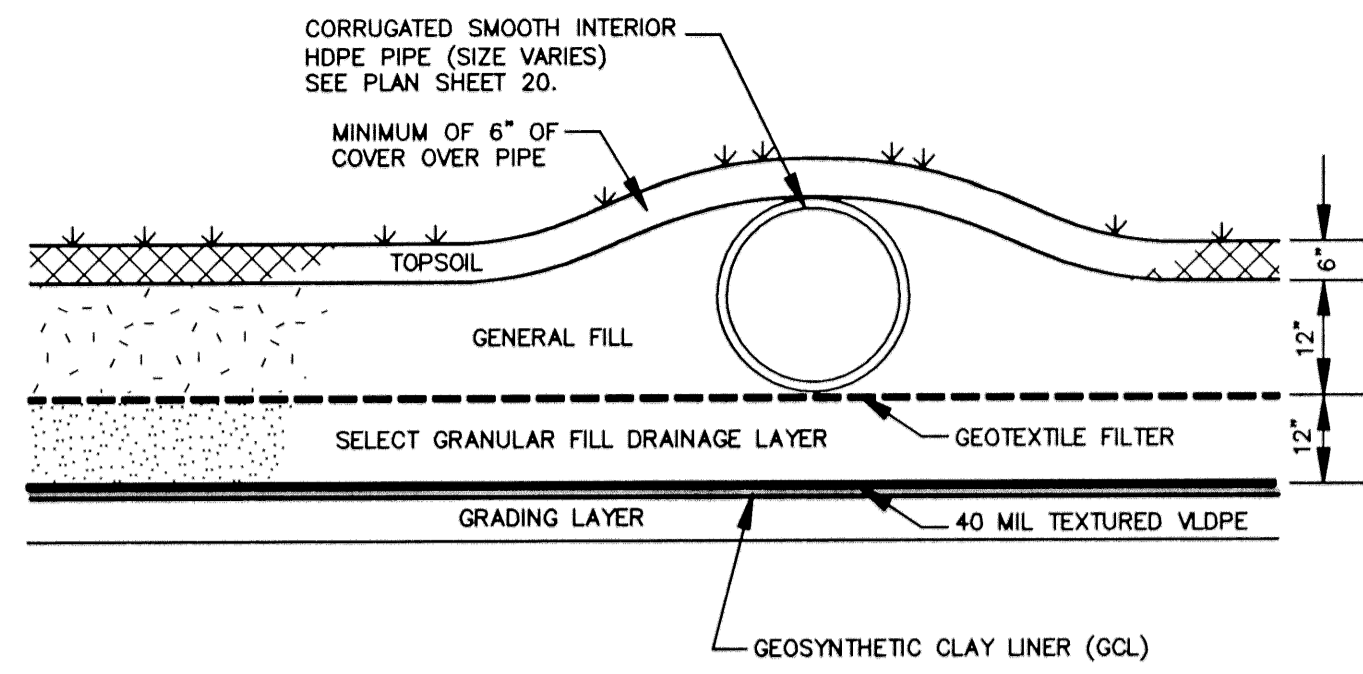
PROJECT: **DAIRYLAND POWER COOPERATIVE
PLAN OF OPERATION
BUFFALO COUNTY, WISCONSIN**

SHEET TITLE: **DETAILS- DOWNSLOPE FLUMES**

DRAWN BY: DEFOEJ	SCALE: NOT TO SCALE	PRJ. NO. 3081.40
CHECKED BY: DM	DATE PRINTED:	FILE NO. 30814008.DWG
APPROVED BY: BJK	DATE: OCTOBER 2000	SHEET 20 OF 23

RMT
744 Heartland Trail
Madison, WI 53717-1934
P.O. Box 8923
Madison, WI 53708-8923
Phone: 608/631-4444

User ID: 80283MAD
 PLOT DATE: 10/20/00
 PLOT TIME: 16:17:55 2001
 ATTORNEY: J. F. ATTORNEY
 Scale: 1:1
 Job No: 3081.40
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 Plot Date: 10/20/00
 Plot Time: 16:17:55 2001
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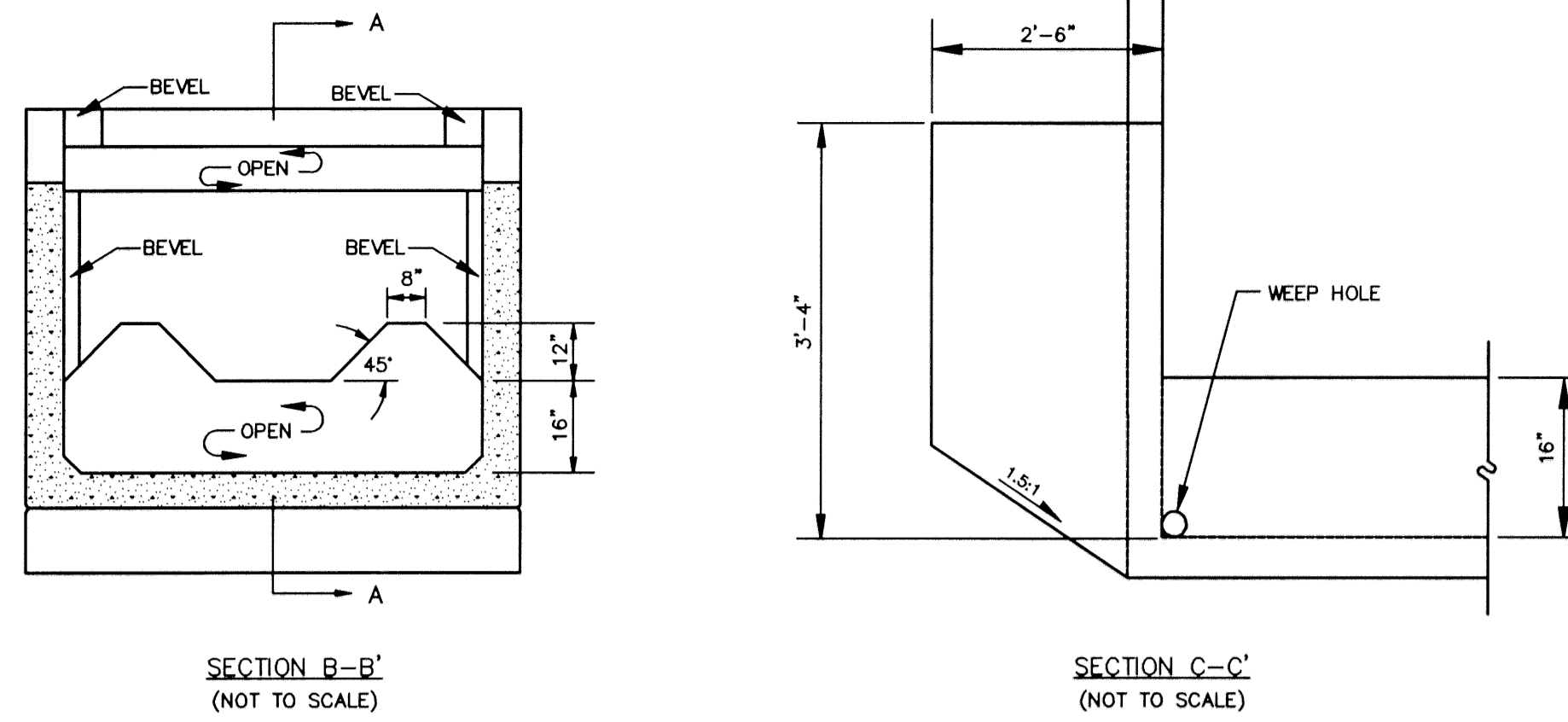


SECTION A-A'

FINAL COVER WITH DOWNSLOPE FLUME PIPE

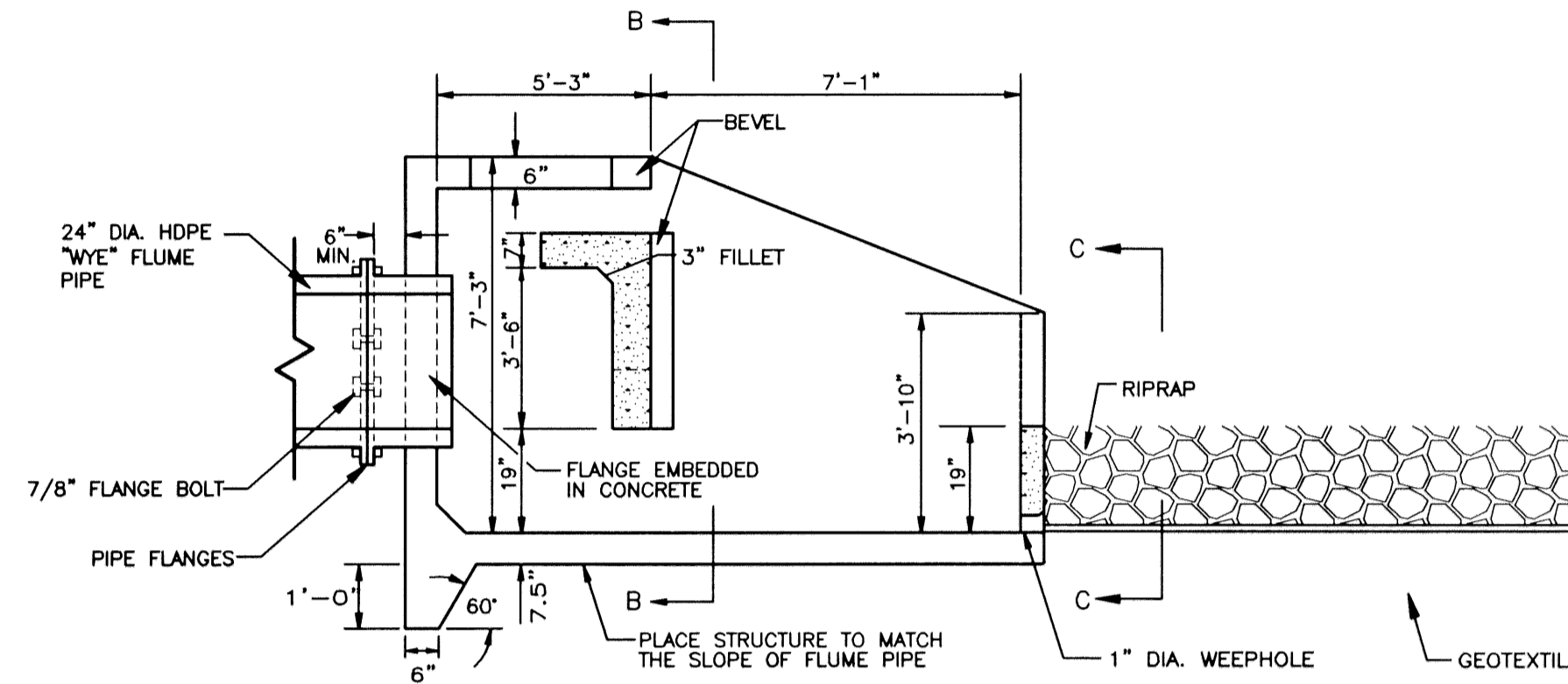
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1
21



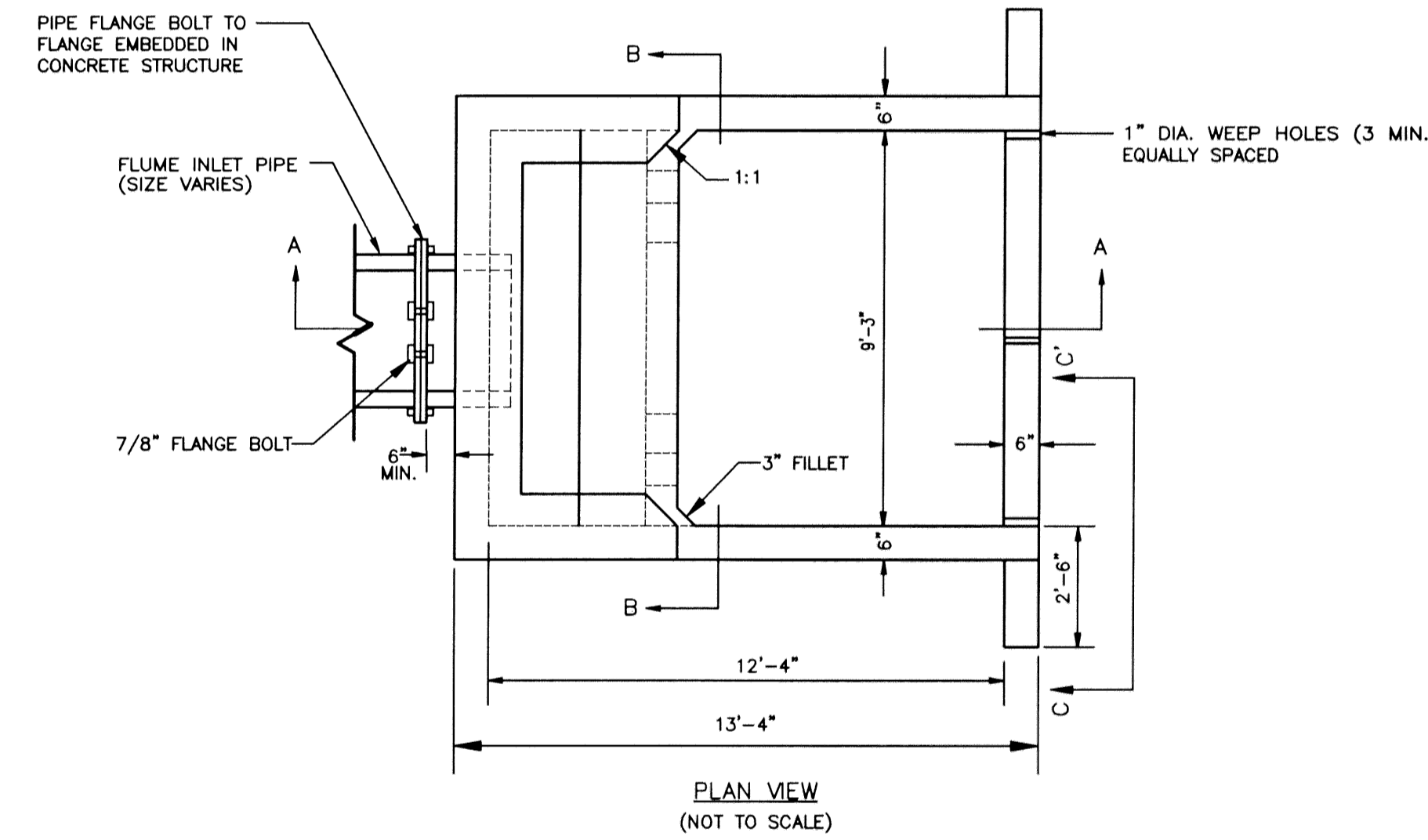
SECTION B-B'
(NOT TO SCALE)

SECTION C-C'
(NOT TO SCALE)



SECTION A-A'
(NOT TO SCALE)

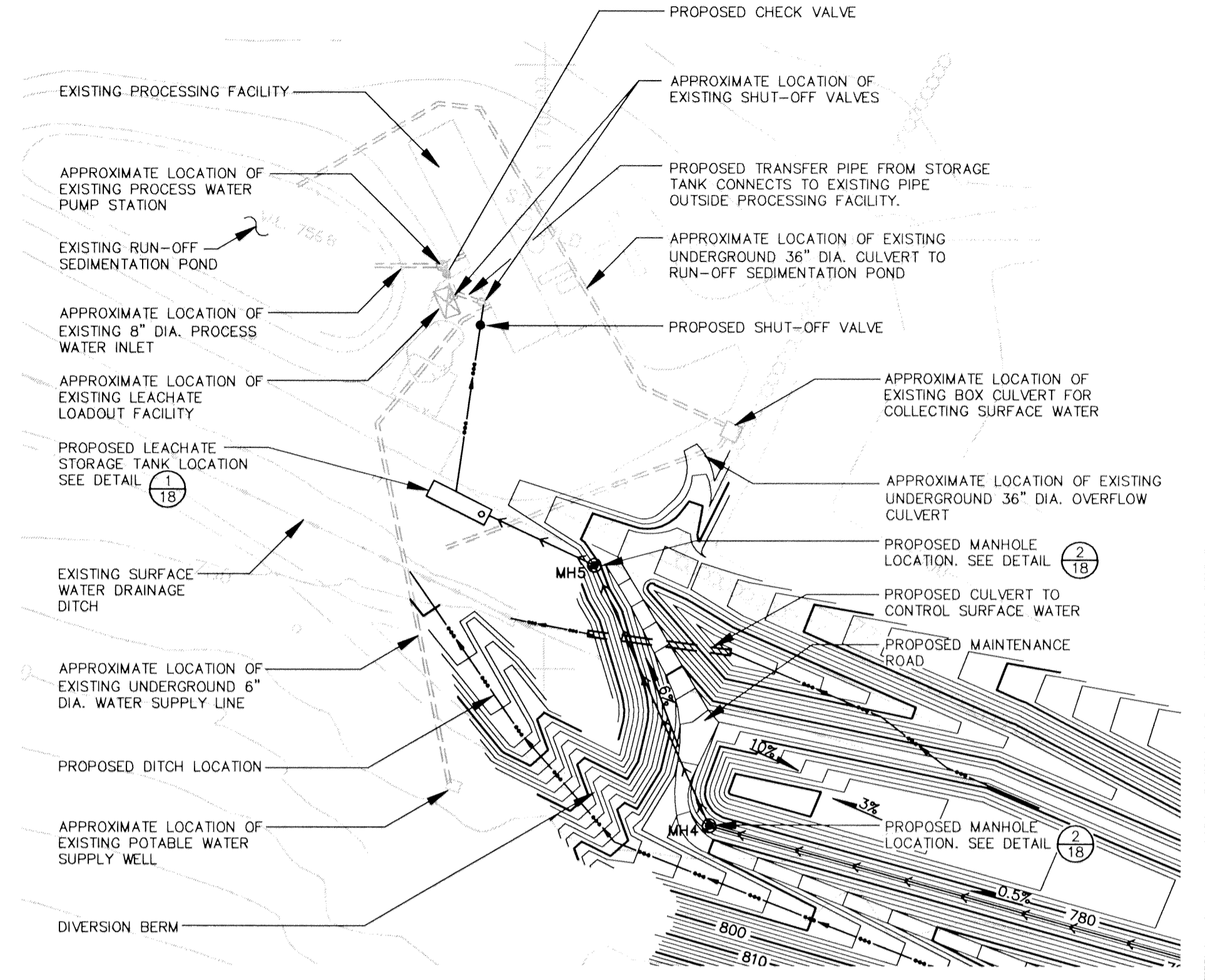
SECTION A-A'
(NOT TO SCALE)



OUTLET STRUCTURE

(NOT TO SCALE)

3
21

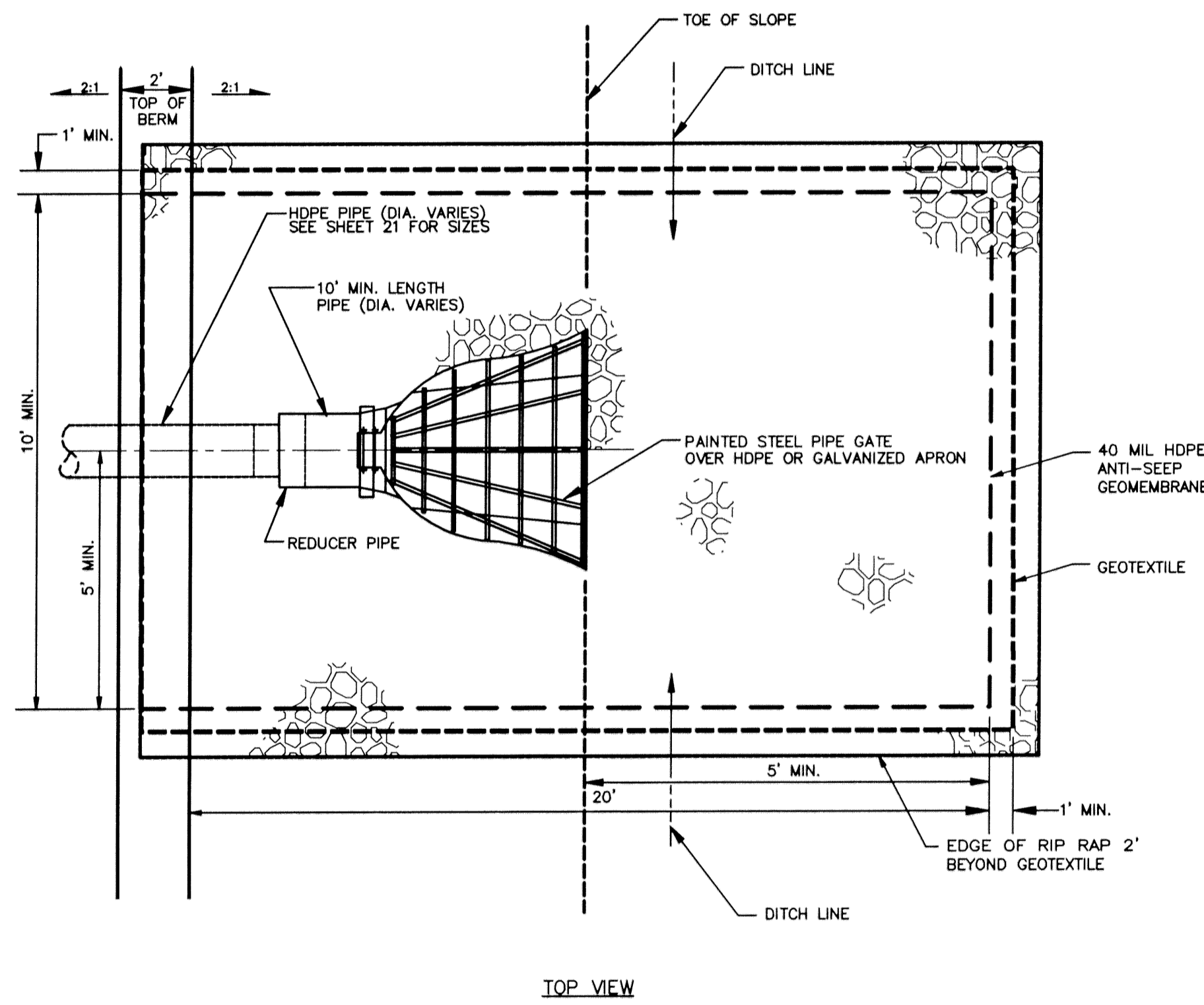


NOTE: SCREENED INFORMATION REPRESENTS EXISTING CONDITIONS. BOLD INFORMATION REPRESENTS DESIGNED FEATURES.

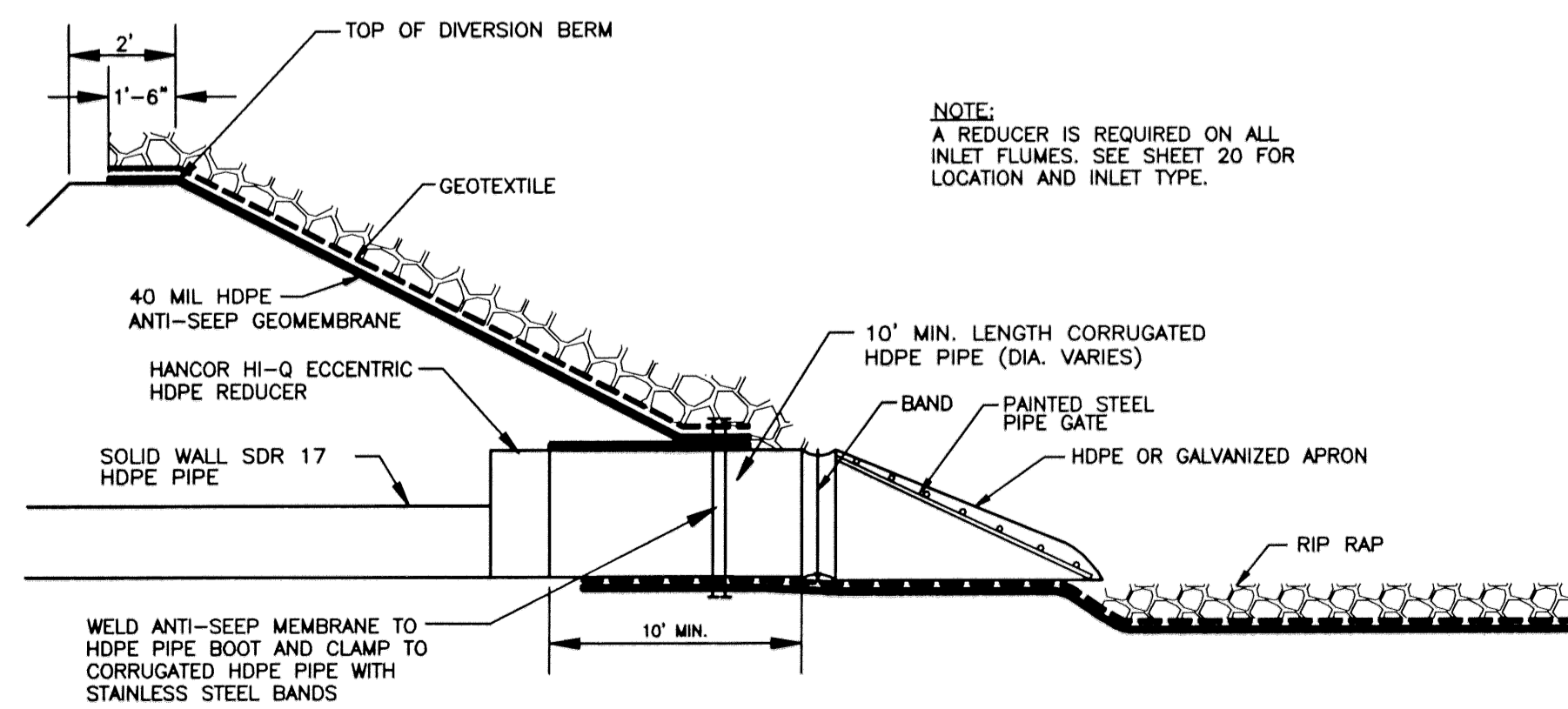
LEACHATE TRANSFER SYSTEM AND EXISTING PROCESSING FACILITY LAYOUT

1"=100'

5
21



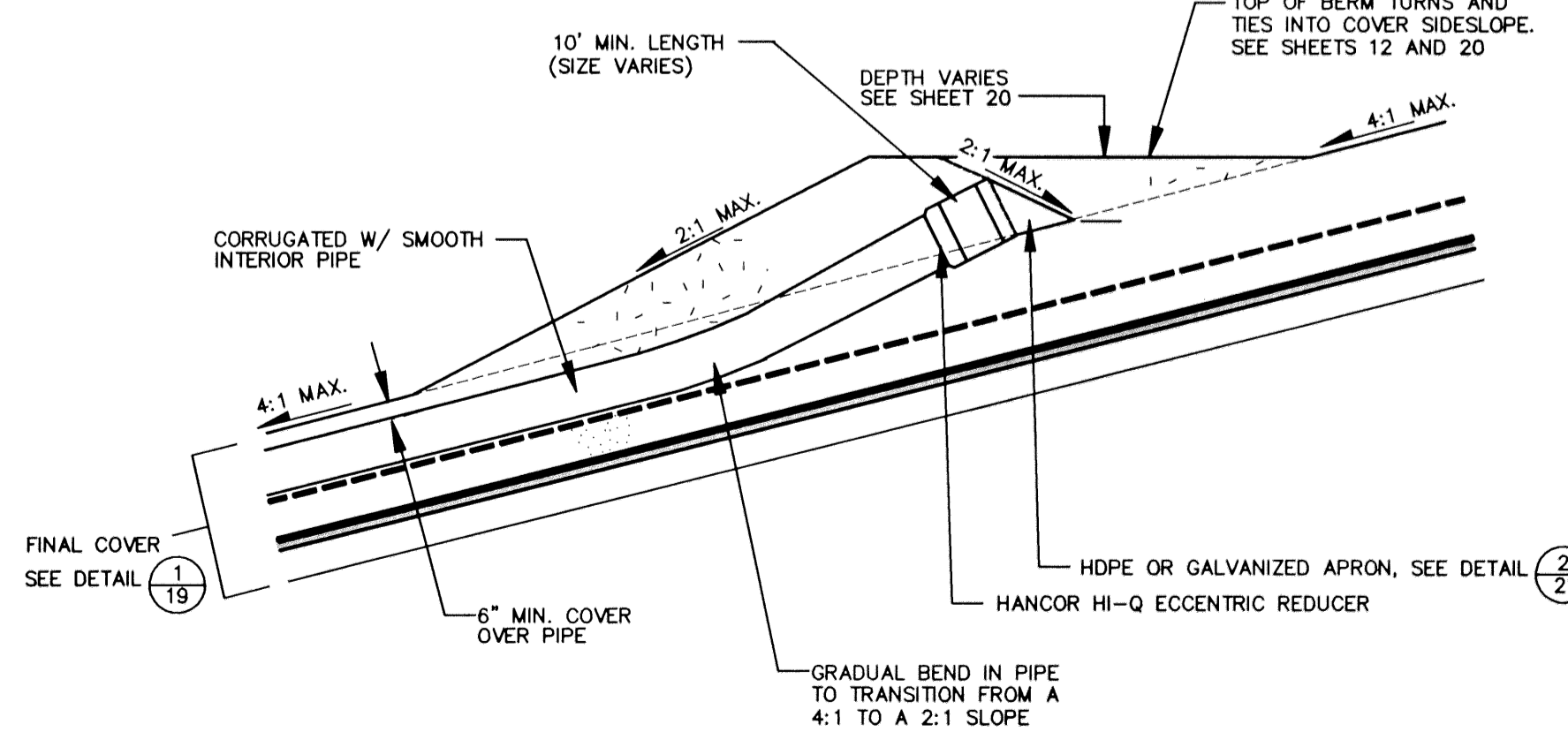
TOP VIEW



INLET STRUCTURE DETAIL (TYPICAL)

(NOT TO SCALE)

2
21



DOWNSLOPE FLUME CROSS SECTION CROSS SECTION ON SIDESLOPE

(NOT TO SCALE)

4
21

LINE AND SHADING LEGEND	
	GEOTEXTILE
	GEOMEMBRANE
	GEOCOMPOSITE
	GEOSYNTHETIC CLAY LINER (GCL)
	TOPSOIL
	NATIVE SOIL
	SELECT GRANULAR FILL DRAINAGE LAYER
	CONCRETE
	PIPE BEDDING MATERIAL
	RIPRAP
	SELECT AGGREGATE FILL
	GRAVEL
	COMPACTED SELECT LOW PERMEABILITY SOIL
	GENERAL FILL

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NOT FOR CONSTRUCTION

NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT: **DAIRYLAND POWER COOPERATIVE PLAN OF OPERATION BUFFALO COUNTY, WISCONSIN**

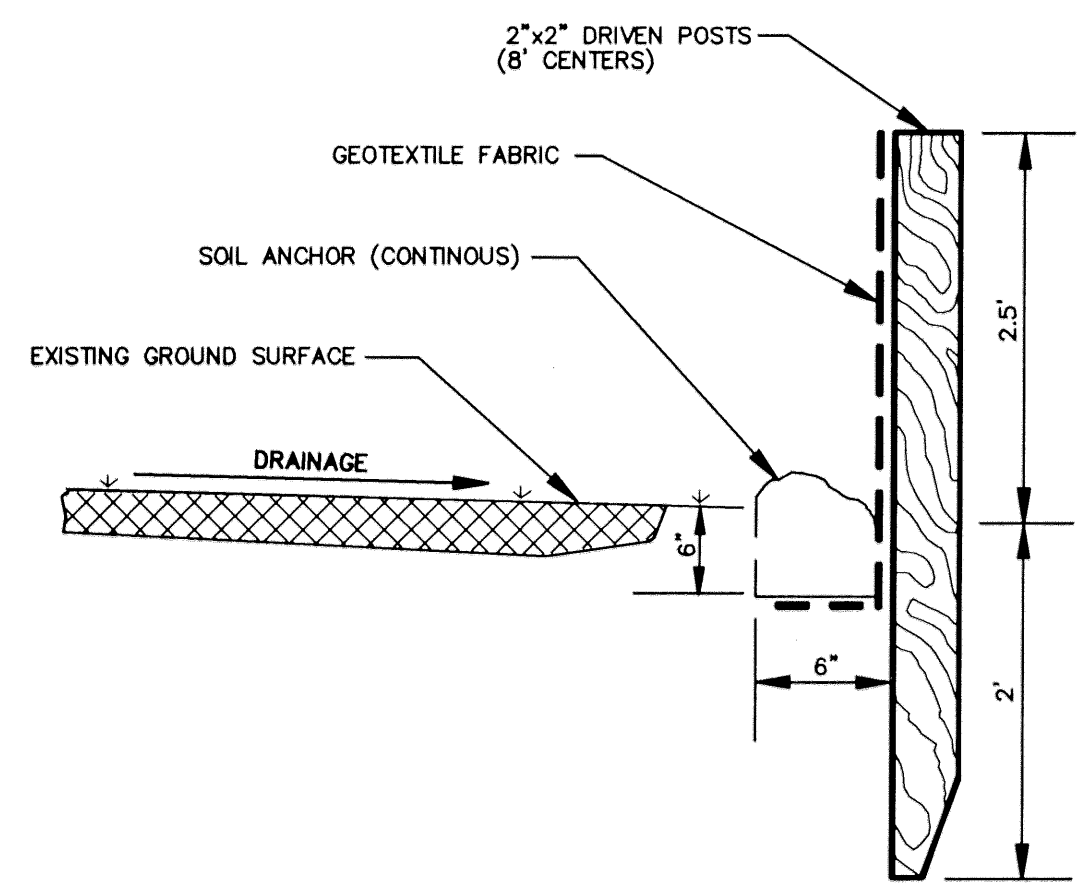
SHEET TITLE: **DETAILS- DOWNSLOPE FLUMES**

DRAWN BY: DEFOEJ	SCALE: NOT TO SCALE	PROJ. NO. 3081.40
CHECKED BY: DM	DATE PRINTED:	FILE NO.30814009.dwg
APPROVED BY: BJK		SHEET 21 OF 23
DATE: OCTOBER 2000		

NOTES:

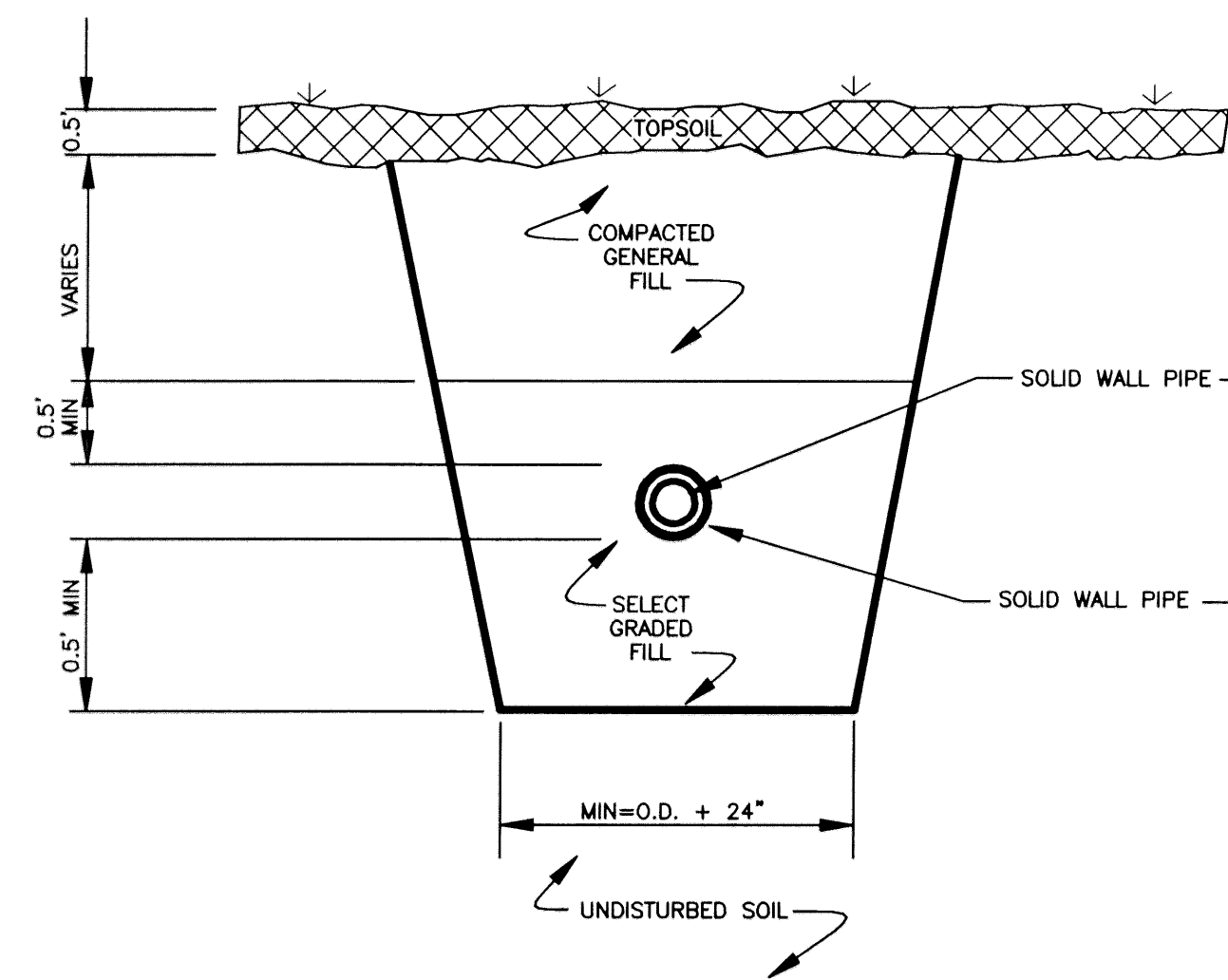
- CORRUGATED HDPE PIPE HAS A SMOOTH INTERIOR.

Scale: 1"=100'
 Date: 10/10/00
 Project: Dairyland Power Cooperative
 Drawing: 3081.40-21
 Author: [Name]
 Checker: [Name]
 Approver: [Name]



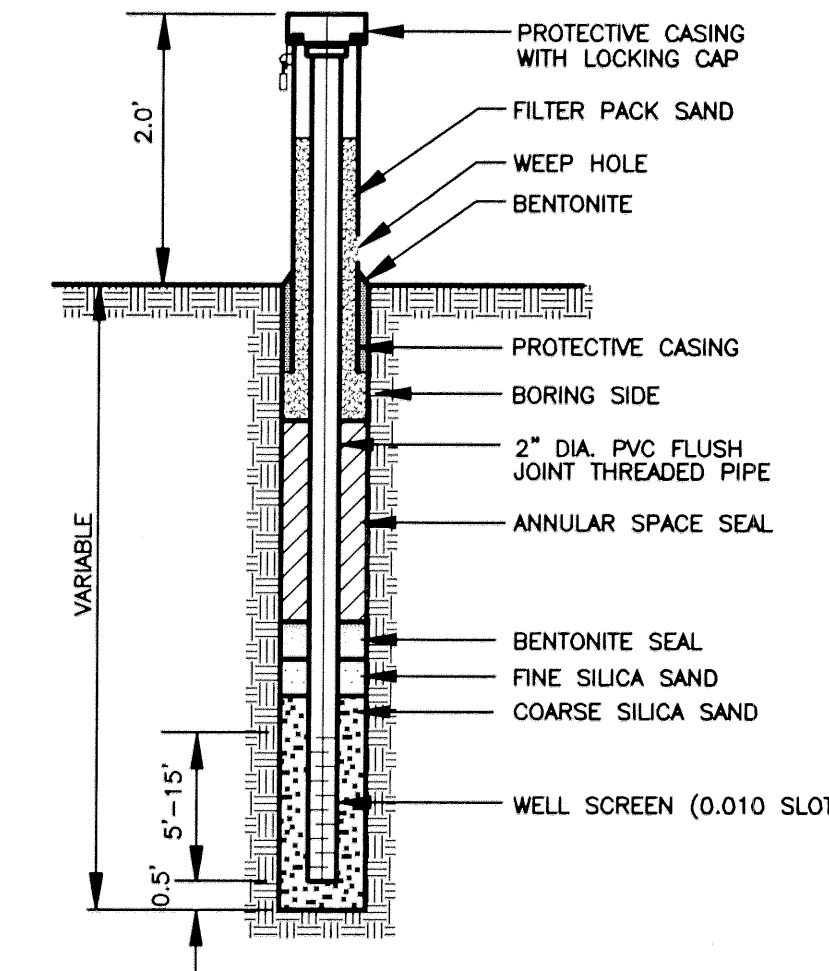
NOTE:
DETAIL SHOWN FOR PURPOSES OF IDENTIFYING INSTALLATION METHOD.
LOCATION OF FENCE WILL BE DETERMINED AT DEVELOPMENT OF
ENGINEERING PLANS FOR EACH PHASE OF CONSTRUCTION AND IN THE
FIELD DURING ACTUAL CONSTRUCTION OF EACH PHASE.

1
23 **SEDIMENT CONTROL FENCE**
(NOT TO SCALE)

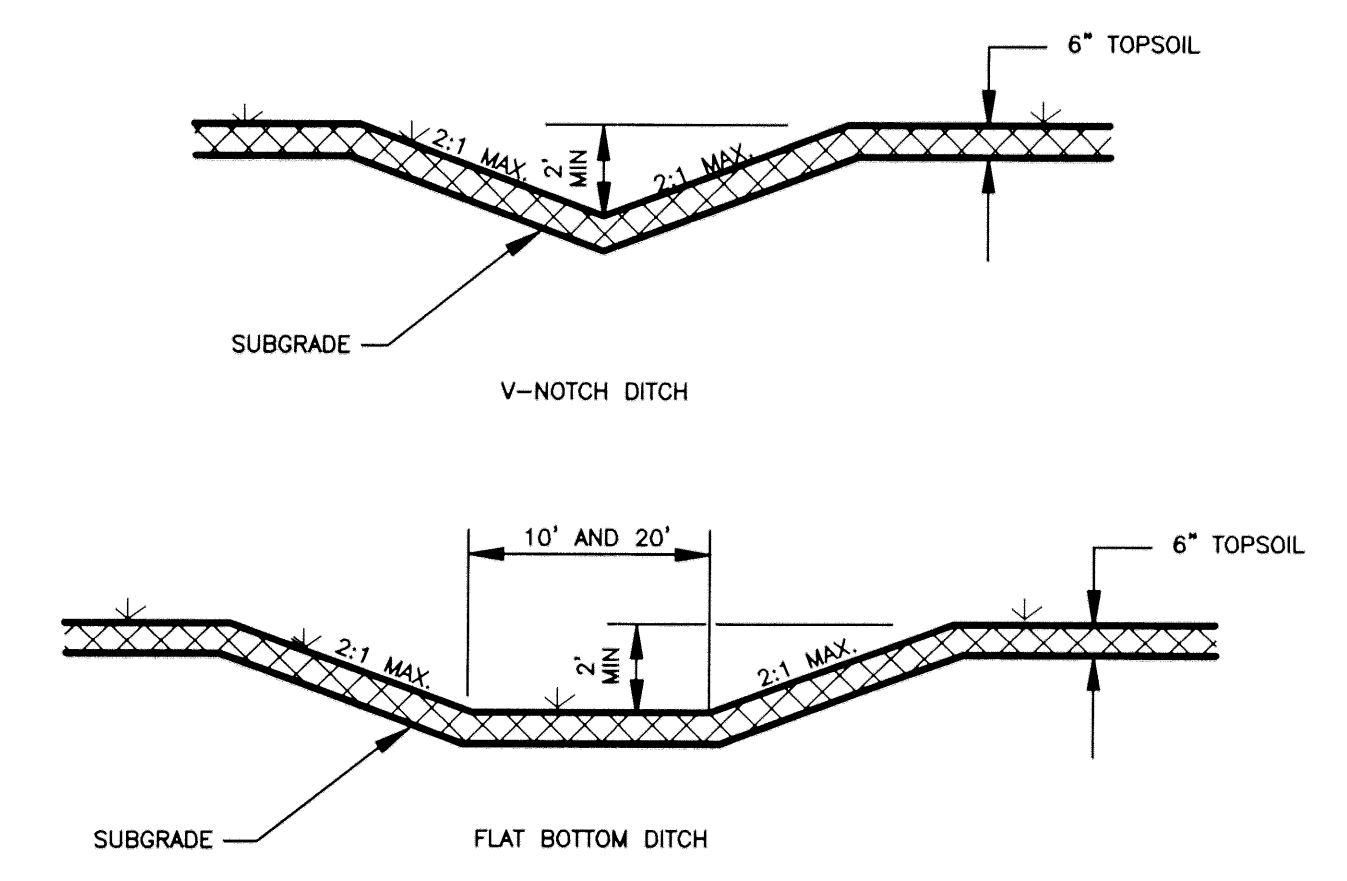


NOTE: DOUBLE WALL PIPE FOR
LEACHATE COLLECTION SYSTEM
TRANSFER PIPE.

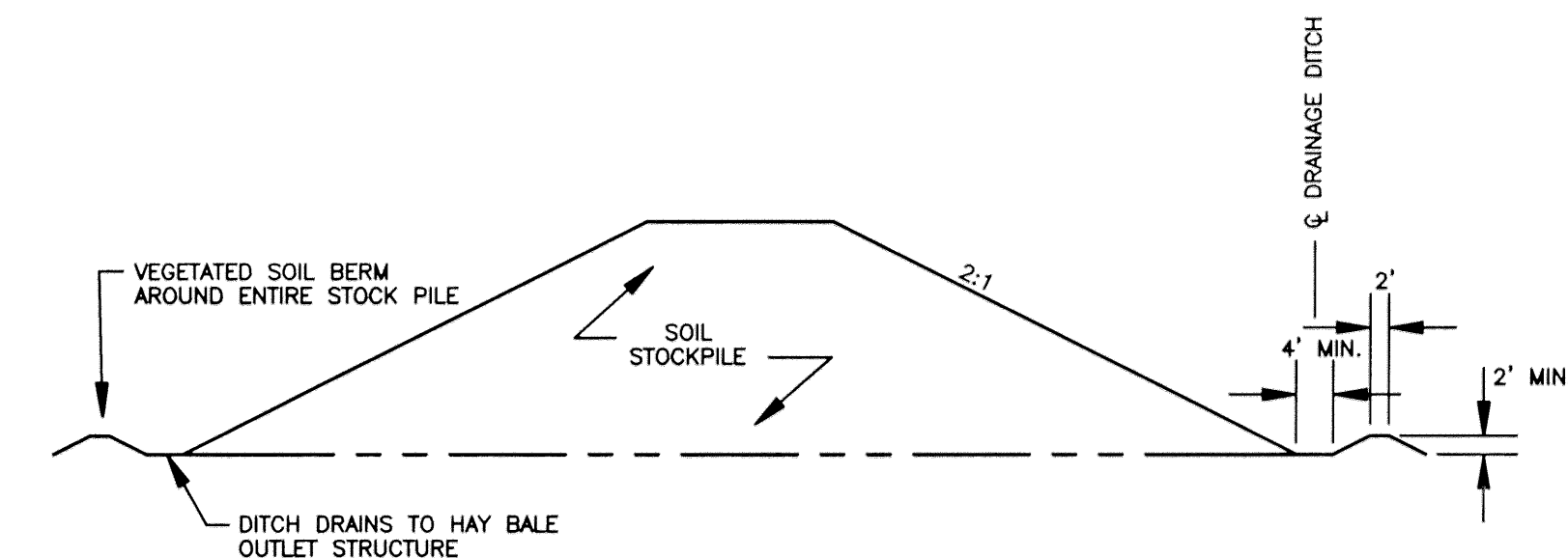
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23 **DOUBLE WALL TRANSFER PIPE**
(NOT TO SCALE)



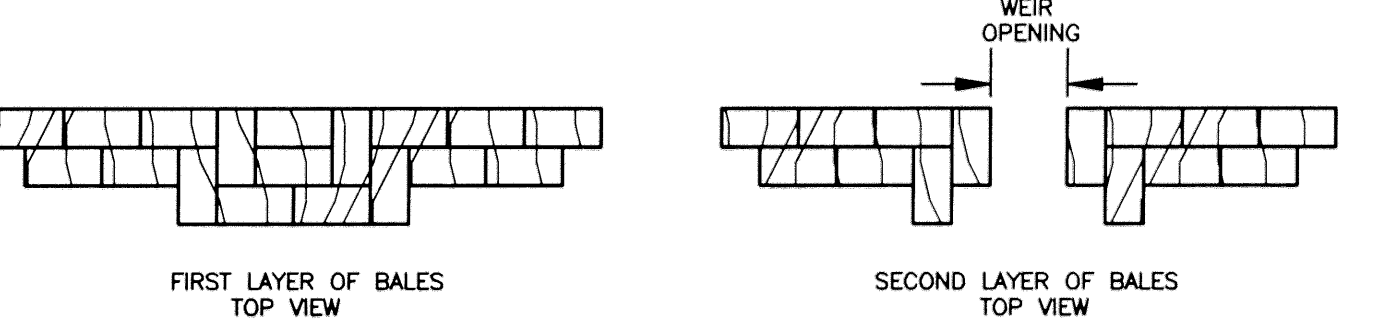
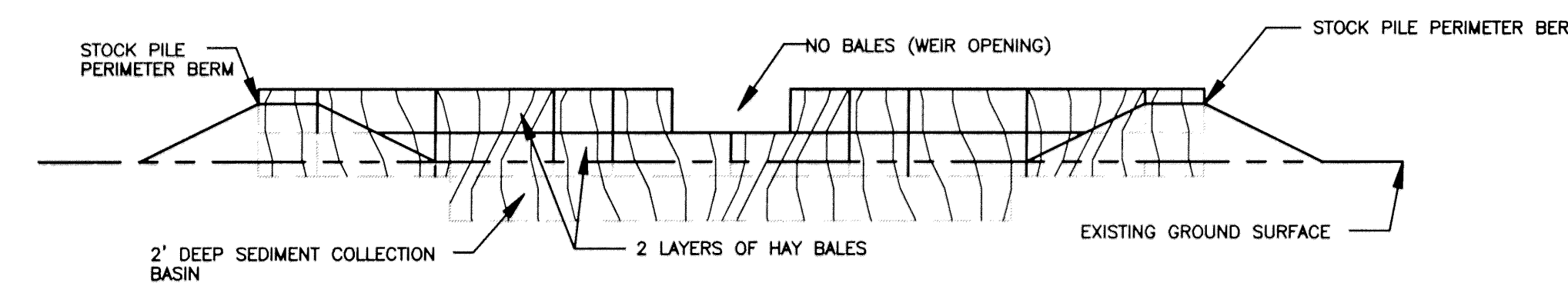
4
23 **WATER TABLE MONITORING WELL**
NOT TO SCALE



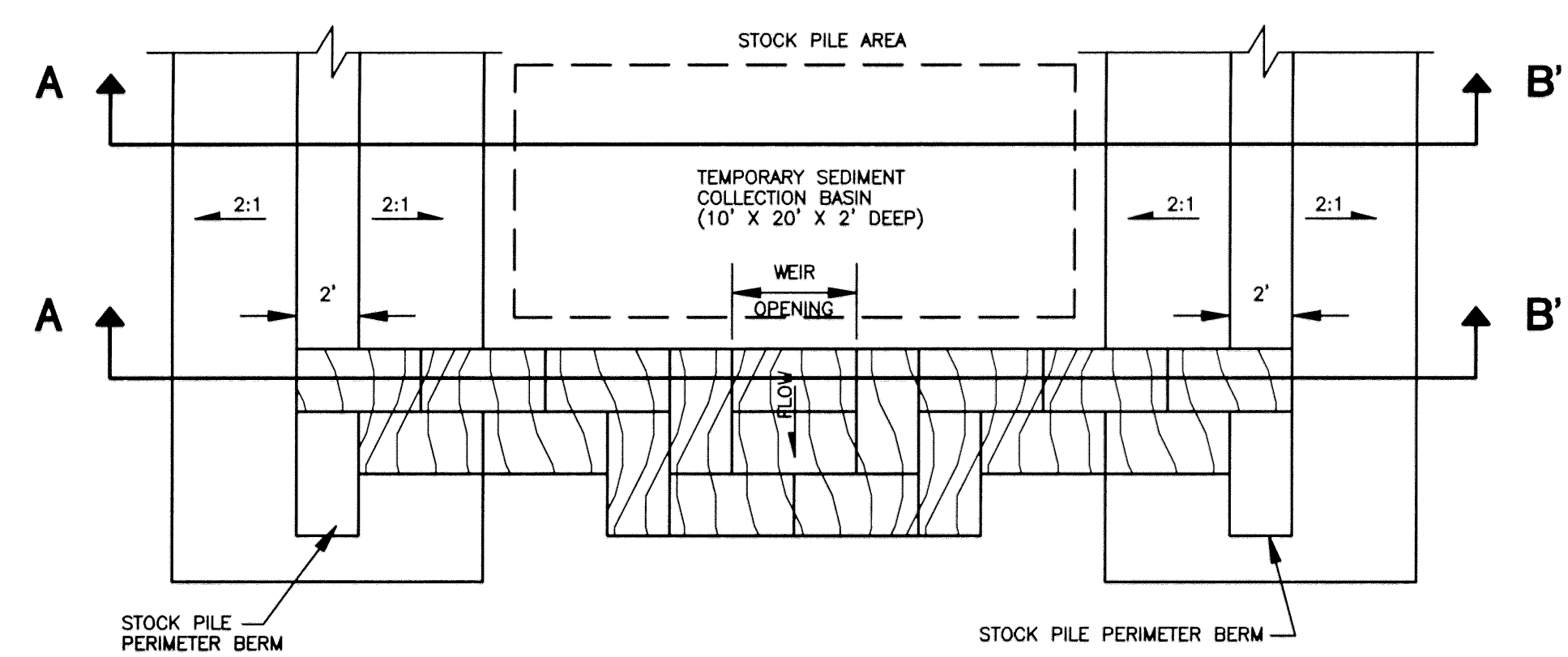
8
23 **DRAINAGE DITCH DETAILS OUTSIDE LANDFILL COVER**
(NOT TO SCALE)



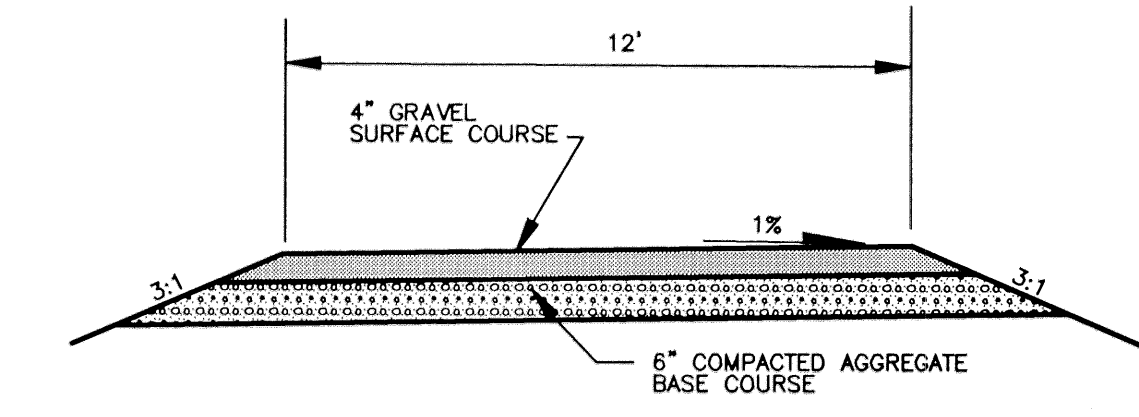
SECTION B-B'



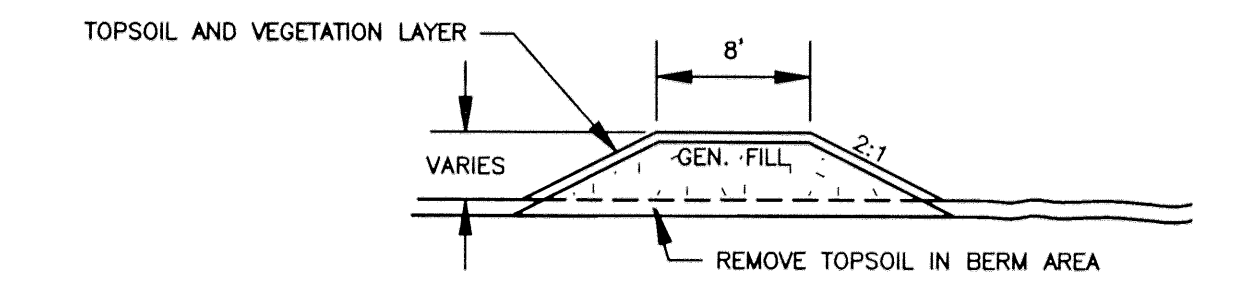
SECTION A-A'



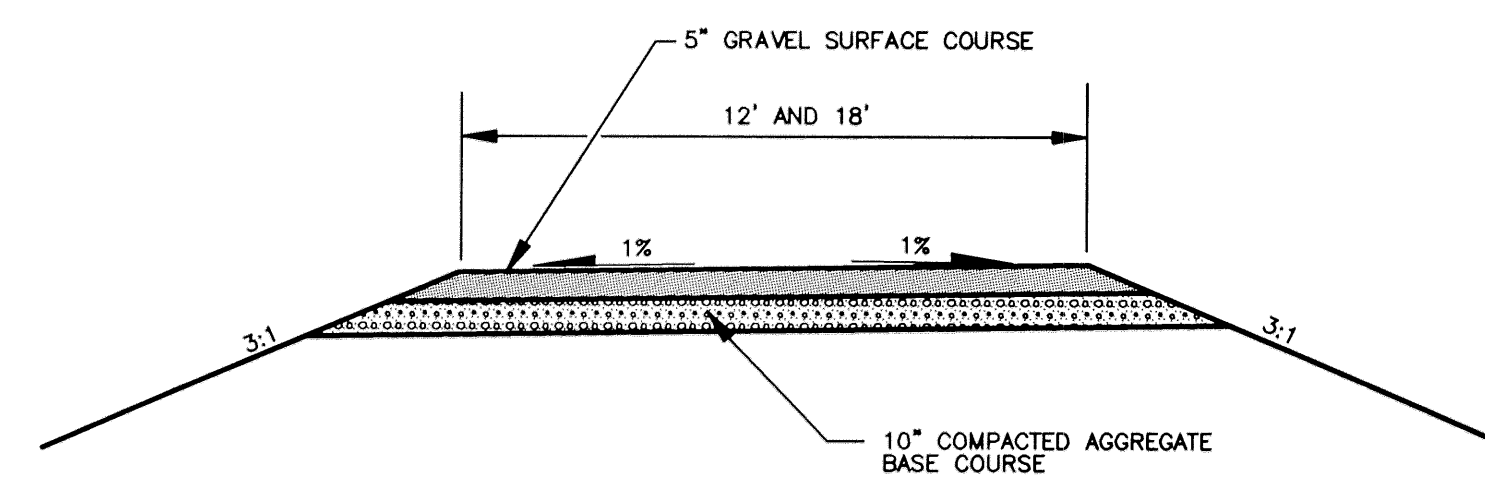
2
23 **SURFACE WATER OUTLET FOR STOCKPILES**
(NOT TO SCALE)



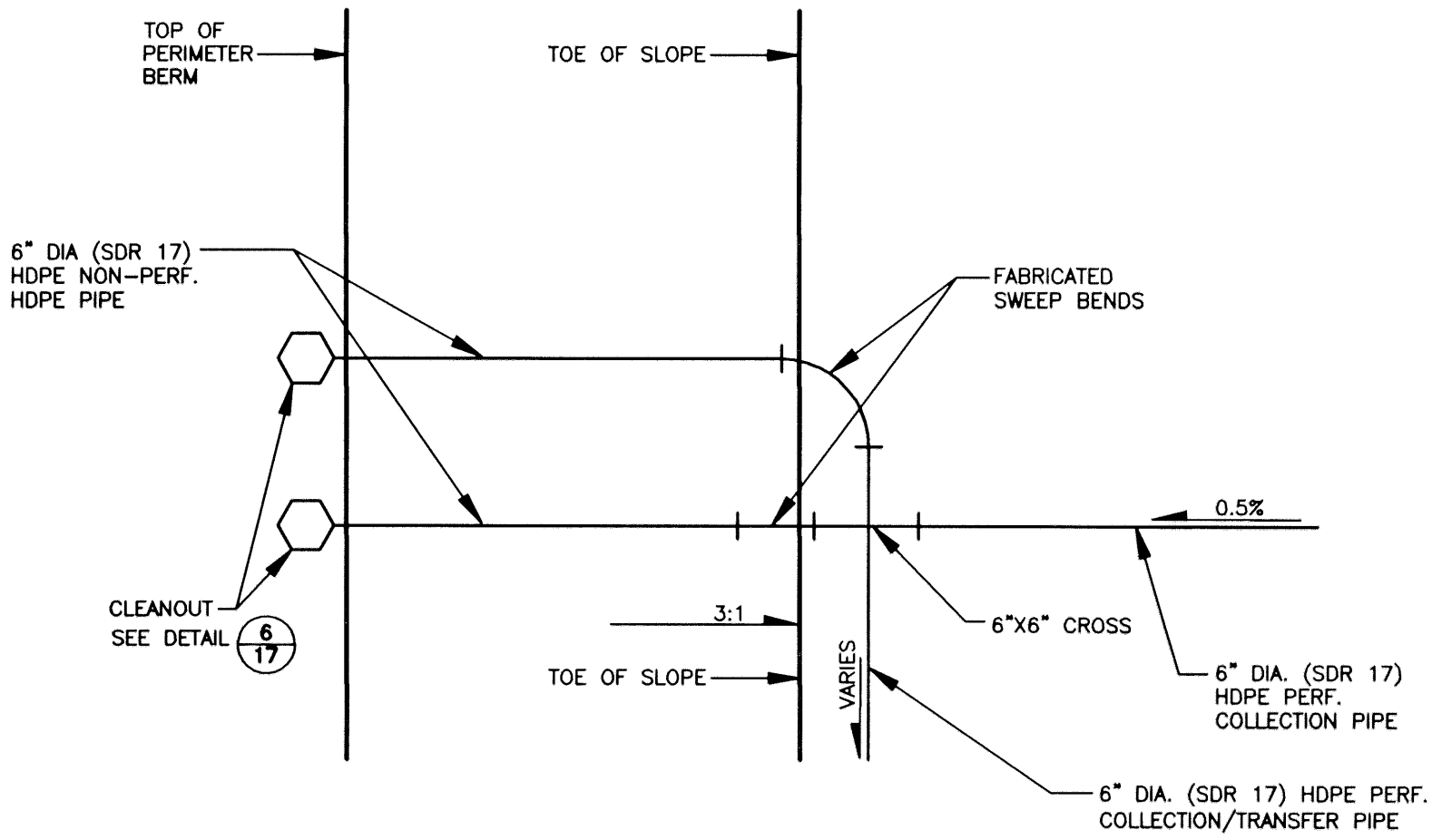
5
23 **MAINTENANCE ROAD**
(NOT TO SCALE)



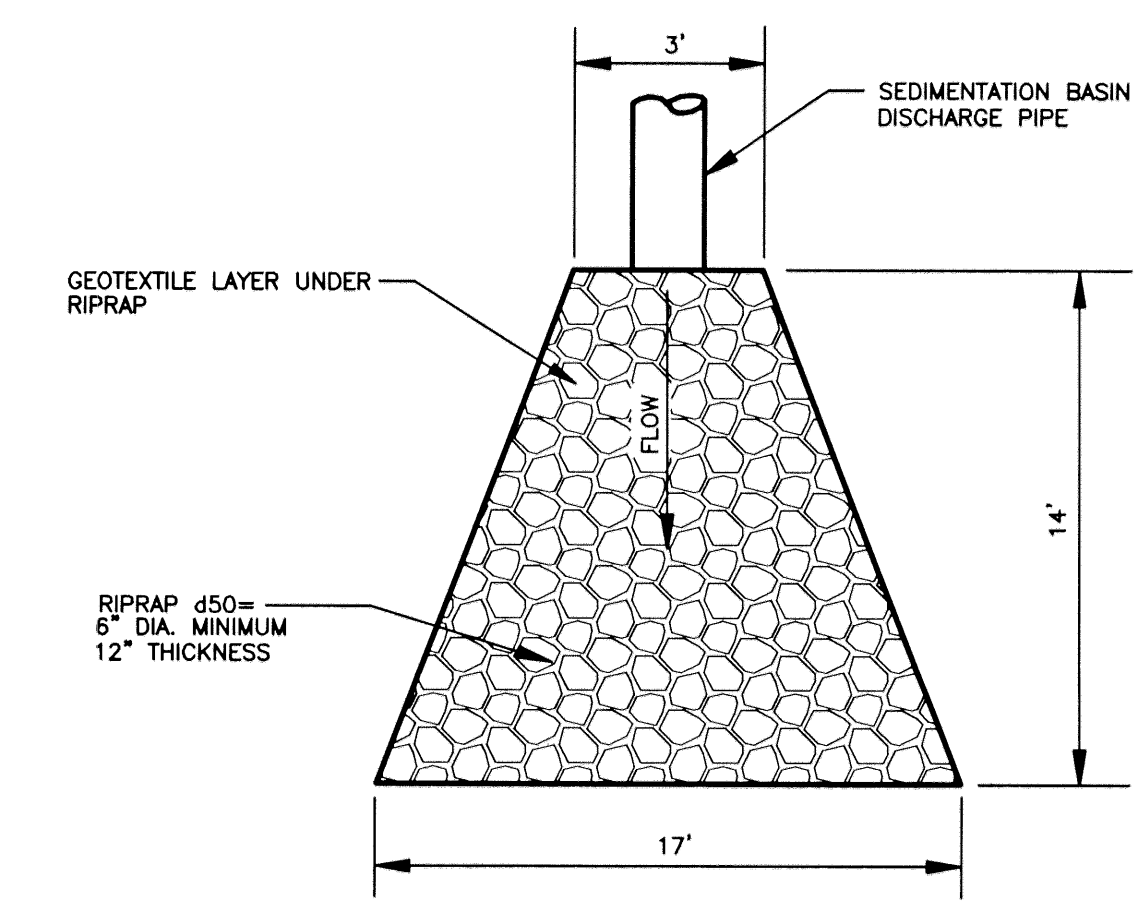
9
23 **TEMPORARY BERM FOR CONTROLLING WATER**
(NOT TO SCALE)



6
23 **ALL WEATHER ACCESS/HAUL ROAD**
(NOT TO SCALE)



7
23 **PIPE CONNECTIONS (TYPICAL)**
(NOT TO SCALE)



10
23 **DISCHARGE PIPE RIPRAP OUTLET PROTECTION BLANKET**
(NOT TO SCALE)

LINE AND SHADING LEGEND

--- GEOTEXTILE	— GEOMEMBRANE
--- GEOSYNTHETIC CLAY LINER (GCL)	--- NATIVE SOIL
--- TOPSOIL	--- CONCRETE
--- SELECT GRANULAR FILL DRAINAGE LAYER	--- RIPRAP
--- PIPE BEDDING MATERIAL	--- GRAVEL
--- SELECT AGGREGATE FILL	--- COMPACTED SELECT LOW PERMEABILITY SOIL
--- GENERAL FILL	

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE TITLE THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED AND REVIEWED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY.
NOT FOR CONSTRUCTION

NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT: DAIRYLAND POWER COOPERATIVE
PLAN OF OPERATION
BUFFALO COUNTY, WISCONSIN

SHEET TITLE: DETAILS- MISCELLANEOUS

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