MWG
Midwest Generation, LLC
Powerton Generation Station
13082 E. Manito Rd.
Pekin, IL 61554

February 26, 2024

Via electronic mail and hand delivery

Mr. Mark Liska
Illinois EPA, Bureau of Water
1021 North Grand Avenue East
Springfield, IL 62702

Re: ***Powerton Generation Station***
Log No. 2021-100029
Bureau ID# W1798010008
MWG Response to Construction Permit to Retrofit Bypass Basin Review Letter

Dear Mr. Liska:

Midwest Generation, LLC ("MWG") received the subject letter, dated February 22, 2024, from the Illinois Environmental Protection Agency ("IEPA" or the "Agency") via email on February 22, 2024. While MWG provided response to the Agency's Permit to Operate a Coal Combustion Residual Impoundment Review Letter dated October 11, 2023 on February 5, 2024 (the "February 5, 2024 Response"), the Agency repeated comments or questions in its February 22, 2024 letter. MWG does not repeat previously provided responses here but instead incorporates the February 5, 2024 Response by reference.

MWG reiterates its request that correspondence regarding Powerton Generating Station ("Powerton Station" or "Powerton") be addressed to:

Powerton Generating Station
Attn: Plant Manager
13082 E. Manito Road
Pekin, IL 61544

The current Plant Manager of Powerton Station is Todd Mundorf.

As we go through the below responses and MWG's February 5, 2024 Response, it is important to note that the Bypass Basin is incredibly small – a single acre. Moreover, retrofitting the Bypass Basin is not the final action at the pond. Rather, pursuant to the Climate and Equitable Jobs Act ("CEJA") Powerton Station must cease generating electricity with coal (and thus will cease generating coal combustion residuals ("CCR")) by January 1, 2030. Separately, yet as important, MWG notified the Agency that Powerton Station will comply with federal Effluent Limit Guidelines given at 40 CFR 423 by ceasing burning of coal at the electric generating units no later than December 31, 2028. Once the generation of CCR ceases, the basin will be closed pursuant to Part 845. During the time between retrofitting the Bypass Basin and closure of the Bypass Basin, the Agency and MWG can continue to work through the Agency's issues that are related to long-term closure of the pond.

Like the February 5, 2024 Response, for ease of review, MWG numbered the Agency's comments, and the numbered IEPA letter is presented as Attachment 1. Numbers given in responses below correspond to the numbers in Attachment 1. These responses may be updated as needed after our meeting in February 2024. Please add this Response with the Attachments to the Ash Surge Basin ("ASB"), Ash Bypass Basin ("Bypass Basin" or "ABB") and Former Ash Basin ("FAB") operating permit application record and the Bypass Basin Application for Retrofit Construction Permit application record.

MWG looks forward to discussing CCRSI permitting for Powerton Station with the Agency. If you have any questions or need additional information, please contact me at sharene.shealey@nrg.com.

Sincerely,

Sharene Shealey
Director, Environmental

Cc *(via electronic mail)*:

David Bacher
Jill Buckley
Todd Mundorf
Walter Stone
Cecilia DeRobertis, USEPA
Lauren Hunt, IEPA
Darin LeCrone, IEPA
EPA.CCR.Part845.Coordinator@Illinois.gov

MIDWEST GENERATION LLC'S RESPONSES

1) Section 9.0 of the Bypass Basin Application for Retrofit Construction Permit ("Application") submitted on July 15, 2022, which is a reproduction of Section 9.0 of the ASB, ABB and FAB Application for Initial Operating Permit submitted on October 30, 2021, presents in detail the information requested in this comment. Section 9.0 references specific regulatory citations as provided in Section 845.220(a)(7) regarding what needs to be included in this part of the Application. Section 9.1 provides a detailed description of the site geology and hydrogeology as required under Section 845.220(a)(7)(A), which in turn references Section 845.620. Section 9.2 presents the groundwater monitoring system design and construction plans as required under Section 845.220(a)(7)(B), which in turn references Section 845.630. Section 9.3 presents a groundwater sampling and analysis program as required under Section 845.220(a)(7)(C), which in turn references Section 845.640. It is noted that in Section 9.3.8 a proposed statistical evaluation plan as required under Section 845.640(f) is specified as Attachment 9-5 of the Application submittal.

2) As referenced in Section 8.2 of the Application, Attachment 8-2 of the Application provides the preliminary written closure plan for the retrofitted Bypass Basin as required by 845.220(b)(4) for retrofit construction permit applications. Per the preliminary written closure plan, MWG currently intends to close the retrofitted Bypass Basin by removal of CCR in accordance with Section 845.740(a). Therefore, as stated in Section 8.3 of the Application, the post-closure care requirements promulgated by Section 845.780 are not applicable to the retrofitted Bypass Basin. Thus, a post-closure care plan need not be, and was not, submitted with the Application.

3) First, no CCR material will be used in any part of the retrofit construction. Second, Section 845.770(a) does not require a final cover system. A final cover system is only required when closing a CCR surface impoundment by leaving CCR in-place under Section 845.750. The Application is for retrofitting an existing CCR surface impoundment under Section 845.770.

Section 845.770(a)(1) does require all CCR and contaminated soils and sediments from the CCR surface impoundment to be removed. Indeed, Note 3.A on Drawing POW-BBR-CSK-004 in Attachment 5-1 of the Application requires all material above the Bypass Basin's existing liner to be removed. This includes any remaining CCR and the Bypass Basin's existing granular protective layers, which are assumed to be contaminated with CCR. Moreover, Note 3.B.III on Drawing POW-BBR-CSK-004 requires the contractor to inspect the exposed soils below all areas of the existing liner that are found to be damaged, if any, to determine whether CCR from the basin has been released into, and has therefore, contaminated the underlying soils. This same note instructs the contractor to remove all such contaminated soil.

Section 845.770(a)(1) does ***not*** require CCR that was intentionally placed for the purposes of forming the embankments of a CCR surface impoundment and/or for providing the foundation for a CCR surface impoundment be removed. In any case, these CCR materials are not CCRs that were sent to the impoundment for storage, treatment, and/or disposal, and are not contaminated soils or sediments impacted by releases from the CCR surface impoundment. Because the Bypass Basin has always had a liner (Hypalon from 1980 to 2010 and HDPE geomembrane since 2010), it is possible to distinguish between the CCR that was used to construct the Bypass Basin and the CCR disposed in the basin when it was last in service. The Bypass Basin's existing HDPE geomembrane liner represents the waste boundary for the basin, thereby distinguishing where CCR has been

historically placed within the basin from where CCR was used to construct the basin's embankments and/or build up the area.

As stated in MWG's February 5, 2024 Response, the CCR required to be removed under Section 845.770(a)(1) during retrofit construction only pertains to CCR that was placed within the Bypass Basin (*i.e.*, within the lined area). CCR within the structural fill used to construct the basin's embankments and CCR within the foundation soils supporting the basin are not part of the impoundment area, regardless of whether the CCR qualifies as beneficial use of CCR under Section 3.135 of the Act and Section 845.150. Therefore, the CCR in the Bypass Basin's embankments and in the basin's foundation soils is not regulated under the Illinois CCR Rule.

As explained in MWG's February 5, 2024 Response, defining a CCR surface impoundment as the area bounded by the dikes (but excluding those structures) is logical, because the definition is contingent upon the ability to accumulate liquid. As U.S. EPA explained when it first promulgated Part 257 Subpart D, on which the Illinois CCR Rule is based, the risks associated with CCR surface impoundments are from the hydraulic head created by the water impounded with the CCR that promotes leaching of contaminants. 80 Fed. Reg. at 21328, 21342, 21357. In its May 2023 Proposed Rule for legacy CCR surface impoundments and CCR management units, U.S. EPA again emphasized the importance of the accumulation of liquid to the definition of a CCR surface impoundment, stating: "Units that contain liquid present different risks than those that do not, and the applicable requirements should differentiate among them accordingly on that basis." Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals From Electric Utilities; Legacy CCR Surface Impoundments, 88 Fed. Reg. 31982 ("Legacy Rule"), p. 31993 (May 18, 2023). U.S. EPA repeats that the key is that impounded water creates a "hydraulic head" in an operating impoundment that "allows for continual leaching of contaminants from the CCR and drives the resulting leachate…potentially into the underlying aquifer." Id. at 32011. Conversely, in its May 2023 proposal to regulate CCR management units ("CCRMUs"), U.S. EPA specifically distinguishes CCRMUs from CCRSIs by stating that "CCRMUs do not contain sufficient liquids to create a hydraulic head or to otherwise cause the conditions that might lead to a structural failure…" Id. at 32017. Because of the absence of the risk from a hydraulic head, U.S. EPA concluded that many of the existing requirements in Part 257 Subpart D applicable to CCRSIs are not necessary for CCRMUs. Id.

U.S. EPA's decision in its May 2023 proposal to distinguish CCRMUs from CCRSIs – and therefore regulate them differently – further supports that the dikes are not a part of the CCRSI definition. U.S. EPA proposed to define a CCRMU as "any area of land on which any non-containerized accumulation of CCR is received, placed, or otherwise managed at any time, that is not a CCR unit." Id. at 32034. U.S. EPA also excluded CCRMUs from the definition of "CCR unit" in its proposal, further creating a distinction between CCR surface impoundments (that accumulate liquids) and CCRMUs (that do not accumulate liquids). Id. Under this proposed definition, U.S. EPA explained that CCRMUs would include "…areas where the solid waste management of CCR on the ground has occurred, such as structural fill sites, [and] CCR placed below currently regulated CCR units." Id at 32018. Finally, U.S. EPA stated that CCRMUs "remain exempt under existing federal CCR regulations," demonstrating that the agency considered CCRSIs and CCRMUs as separate features. Id. at 32013. Therefore, in the context of the Bypass Basin, the boundary where the CCRMU ends (currently not regulated) and a CCRSI begins (currently regulated) is the existing HDPE geomembrane liner. Accordingly, the dikes (*i.e.*, structural fill sites) in which the Bypass

Basin sits and the CCR in the foundation soils below the basin's liner are CCRMUs and are not part of the regulated CCRSIs.

Finally, it would be inappropriate for MWG to preemptively install a final cover system over any CCRMU area before U.S. EPA finalizes its May 2023 proposal for CCRMUs. It is possible that U.S. EPA's Final Rule will impose different closure standards for CCRMUs than currently specified for CCRSIs. Per the 2016 Water Infrastructure Improvements for the Nation (WIIN) Act, the Station will continue to be subject to both the Illinois and Federal CCR Rules until the Illinois EPA submits its CCR permit program to U.S. EPA for approval and the latter approves the permit program. Given that the Station continues to be subject to both federal and state regulations for the foreseeable future, and given the possibility that the Federal CCR Rule's closure standards for CCRMUs may be different from the Illinois CCR Rule's closure standards for CCRSIs, it would not be prudent for MWG to close a CCRMU in accordance with the Illinois CCR Rule's standards for closing a CCRSI prior to U.S. EPA's Final Rule for CCRMUs becoming effective.

4) Refer to MWG's February 5, 2024 Response, Item 5. Also note that on Drawing POW-BBR-CSK-004, Note 3.D, the construction contractor is required to develop and implement fugitive dust controls during CCR material removal in accordance with 35 Ill. Adm. Code 845.740(c)(2).

5) Specification P-1400, which is provided in Attachment 5-1 of the Application, and which provides the material and installation requirements for the General Work ("GW") Contractor performing the retrofit work, addresses stormwater management during construction. Per Spec. P-1400, Sect. 011100, Par. 103.2d, the GW Contractor is responsible for "dewatering of all areas that collect storm water or groundwater in the area controlled by the [contractor] and redirecting any surface water as a result of rainfall or water generated by the [retrofit work]." Because the Bypass Basin is diked on all sides, stormwater accumulation during construction will be limited to direct rainfall into the basin. Per the subject paragraph of Spec. P-1400, the GW Contractor will be responsible for disposing of all such stormwater in accordance with the Station's NPDES permit. Moreover, Note 3.E on Drawing POW-BBR-CSK-004 requires the GW Contractor to develop and implement measures to prevent contamination of surface water, groundwater, soil, and sediments during excavation of CCR and the existing granular protective layers from the Bypass Basin in accordance with Section 845.740(c)(4).

6) The purpose of Section 1.5 is to provide the name and size of the watershed in which the Bypass Basin is located, as required by Section 845.220(a)(1)(C) for all construction permit applications. Section 845.220(a)(1)(C) does not require an evaluation of a CCR surface impoundment's proximity to a floodplain. Instead, this comparison is required by Section 845.340(c), which is addressed in Section 7.1.6 and Attachment 7-2 of the Application. As stated in Section 7.1.6, and as shown in Attachment 7-2, the Bypass Basin is not located in a floodplain according to National Flood Hazard Layer FIRMette Map No. 17179C0175E prepared by the Federal Emergency Management Agency. Therefore, MWG does not need to address the potential for flood waters overtopping the Bypass Basin's embankments.

7) The 2016 History of Construction prepared by Geosyntec is provided as Attachment 2.

8) MWG will revise Section 1.6.1 of the Application as expeditiously as practical to indicate the materials identified in the borings in the report referenced in this comment. However, while Section 845.770(a) does require removal of contaminated subsoils, the CCR that was intentionally placed for the purposes of forming the Bypass Basin's embankments and/or building up the area do not

constitute contamination from the Bypass Basin and, therefore, do not need to be removed as a part of the proposed retrofit construction. These structural fill areas are CCRMUs as defined in U.S. EPA's May 2023 Proposed Rule and are not currently regulated by the Federal CCR Rule or the Illinois CCR Rule. Refer to MWG's Response No. 3, above, for additional discussion on this matter.

9) MWG will revise Section 1.7.1 of the Application as expeditiously as practical to indicate the materials identified in the borings in the report referenced in this comment.

10) Although the Agency references Section 1.7.1 of this comment, the context of the comment indicates the Agency meant to reference Section 1.7.2, "Construction Methods." If so, MWG disagrees with this comment. Section 1.7.2 does not need to take into consideration what materials were used to construct the Bypass Basin's embankments because Section 1.7.1 already addresses that topic. Instead, Section 1.7.2 describes how the construction materials referenced in Section 1.7.1 were placed, compacted, and graded to form the Bypass Basin's embankments.

11) MWG requests clarification from the Agency on this comment. First, it is not clear why Section 2.0 of the Application is referenced in this comment when Section 2.0 does not discuss the comment's subject matter (retrofit construction, closure construction, or corrective action). Second, MWG is not suggesting that retrofitting a CCRSI under Section 845.770 is the same process or part of the process as closure by removal under Section 845.740. Section 8.2 and Attachment 8-2 of the Application provide the preliminary written closure plan for the ***retrofitted*** Bypass Basin as required by Section 845.220(b)(4) for all retrofit construction permit applications.

12) Please refer to the February 5, 2024 Response, Item 14.

13) Section 845.220(a)(2)(E) does not require the on-site transportation plan to address roads outside of the facility's property. The plan only needs to include "all existing and planned roads ***in the facility*** that will be used during the operation of the CCR surface impoundment." (Emphasis added.) Therefore, Section 2.5 of the Application does not need to address noise and entry to Manito Road or dust suppression measures.

However, MWG does address the Agency's comment in Section 5.1 of the Application, in the Design Drawings (*see* Attachment 5-1 of the Application), and in the written retrofit plan for the Bypass Basin (*see* Attachment 8-1 of the Application). Because CCR and CCR-mixed soils (*i.e.*, the Bypass Basin's existing granular protective layers) will be removed and transported off-site for disposal, MWG is requiring the contractor transporting these materials off-site to handle and haul the material in accordance with Section 845.740(c). Per Notes 3.D, 3.E, and 3.F on Drawing POW-BBR-CSK-004 in Attachment 5-1 of the Application, the GW Contractor must 1) develop and implement fugitive dust controls during material removal from the Bypass Basin area in accordance with Section 845.740(c)(2); 2) develop and implement measures to prevent contamination of surface water, groundwater, soil, and sediments during material removal from the Bypass Basin area in accordance with Section 845.740(c)(4); and 3) prepare a report at the end of each month documenting the contractor's progress in removing CCR and CCR-mixed soils from the area in accordance with Section 845.740(d). These requirements are summarized in Section 5.1 of the Application and in the written retrofit plan provided in Attachment 8-1 of the Application.

14) Section 5.2 does not state structural fill will be removed from the Bypass Basin's embankments. The Design Drawings in Attachment 5-1 of the Application show that placement of structural fill for retrofit construction will be limited to the existing impoundment area (*i.e.*, within the existing liner area). Removing structural fill from this area would compromise the basin's existing HDPE

geomembrane liner, which MWG is proposing to re-use as part of retrofitting the Bypass Basin in accordance with Section 845.770(a)(4).

CCR is not specified to be used as, and will not be permitted to be used as, any fill material shown on the Design Drawings or specified in Specification P-1400 for retrofitting the Bypass Basin. *See* Attachment 5-1 of the Application, specifically Spec. P-1400, Sect. 319005 and the Design Drawings.

15) The basis for establishing the bottom of the Bypass Basin at elevation 457 feet amsl is provided in Attachment 1-2 of the Application. This attachment provides the as-built construction plan for the work performed in 2010 to replace the basin's original Hypalon liner with its current HDPE geomembrane liner. *See* Dwg. D1965C020-02 ("Liner Subgrade Preparation") in Attachment 1-2.

MWG requests clarification from the Agency regarding why the Ash Surge Basin and Former Ash Basin are discussed in this comment. The entire Application, including Section 7.1.1, addresses only the proposed retrofit construction for the Bypass Basin. The Ash Surge Basin and Former Ash Basin are not subjects of the retrofit construction proposed in the Application.

16) Section 7.1.2 of the Application, "Wetlands," accurately states that the Bypass Basin is not located within wetlands and that the basin meets the location restriction standard. Moreover, because no lateral expansions are planned as part of retrofitting the basin, the retrofitted Bypass Basin will continue to meet the location restriction standard. Thus, no demonstration is required for this basin pursuant to Section 845.310(a).

17) MWG requests clarification from the Agency on this comment. The Former Ash Basin is not the subject of the Application, which is for a retrofit construction permit for the Bypass Basin. No proposed construction related to the Former Ash Basin is discussed in the Application. This comment is addressed in MWG's February 5, 2024 Response, Item 20.

18) See MWG Response No. 15, above, regarding the basis used to establish the bottom of the Bypass Basin at elevation 457 feet amsl. As stated in Section 7.1.1 of the Application, "Placement Above the Uppermost Aquifer," MWG demonstrated the Bypass Basin is separated from the upper limit of the uppermost aquifer by at least five feet in accordance with Section 845.300(a) in the ASB, ABB and FAB Application for Initial Operating Permit submitted on October 30, 2021. Therefore, the Bypass Basin can be retrofitted under Section 845.770.

19) MWG requests clarification from the Agency on this comment. Sections 845.230(d)(2)(J) and (K) are requirements for ***initial operating*** permit applications. The Application is for a ***retrofit construction*** permit. Presuming this is a typographical error and the Agency meant to reference Sections 845.220(b)(4) and (5), refer to Response No. 2.

20) Section 8.3 does not equate retrofitting a CCR surface impoundment under Section 845.770 to closure by removal under Section 845.740. Section 8.3 states that a post-closure care plan is not being submitted for the *retrofitted* Bypass Basin under Section 845.220(b)(5) because MWG's preliminary written closure plan for the *retrofitted* Bypass Basin (*see* Attachment 8-2 of the Application) calls for closing the basin by removing CCR and CCR-mixed materials in accordance with Section 845.740(a). Therefore, as stated in Section 8.3, the post-closure care requirements promulgated by Section 845.780 are not applicable to the *retrofitted* Bypass Basin.

21) Please refer to the February 5, 2024 Response, Item 26.

22) Please refer to the February 5, 2024 Response, Item 26.

23) The opening paragraph of Application Section 9.1.1 is a very general discussion of the physiography and near surface soils in the general vicinity of the site. This information was obtained from the Soil Survey of Tazewell County, Illinois which is a publication of the US Department of Agriculture (USDA), hence the near surface soil descriptions are based on the USDA categorization. Using this reference in such general introductory discussions for overall local surficial physical conditions is common practice. Subsequent discussion in this section goes on to include specific descriptions from the on-site monitoring well boring logs which use Unified Soil Classification System (USCS) terminology.

Relative to the use of this information for engineering design considerations, discussions with the project engineers indicate that the information provided on the site-specific borings logs was sufficient and was used in the various design and loading calculations for the retrofit design work. The need for additional information will be further discussed with the Agency during the upcoming meeting.

Relative to the last portion of this comment regarding alluvial processes of deposition and erosion and their consideration in retrofit design evaluation, this will be discussed with the Agency during the upcoming meeting to obtain clarification from the Agency.

24) Please refer to the February 5, 2024 Response, Item 40.

25) Please refer to the February 5, 2024 Response, Item 25.

26) Please refer to the February 5, 2024 Response, Item 26 (also see response to items 21 and 22 above).

27) Part 845 does not contain any requirement within the groundwater monitoring requirements that requires collecting dissolved oxygen (DO) and oxidation reduction potential (ORP). These are not routinely required for CCR monitoring. The need and use of this data for this monitoring program is not clear and will be further discussed during the upcoming meeting.

28) Please refer to the February 5, 2024 Response, Item 27.

29) The Powerton Station currently has a facility wide Emergency Action Plan ("EAP") that addresses weather/natural disaster emergencies, flooding emergencies, a fire emergency, a spill/release emergency, medical emergency, active shooter, water rescue, an explosion, and the OSHA requirements, including those contained within 29 CFR 1910.38. MWG's EAPs for the ASB, ABB, and FAB attached to its Initial Operating Permit Application comply with Section 845.520, including 845.520(b)(1). However, in response to the Agency's previous comments, MWG updated the EAP for the ASB and ABB to include weather emergencies that could occur during the operation and maintenance of the CCRSIs. Any other instance not covered in the CCRSIs Emergency Action Plan would be dealt with in accordance with the station's existing Emergency Plan.

The existing fugitive dust control plan addresses the removal of CCR as part of typical cleaning that occurs resulting from normal operations of the CCRSI. This includes minimizing the stockpile height, spraying with water, and covering any stockpiles. Spraying CCR with water would occur on an as needed basis depending on the frequency of precipitation during operating and retrofitting

activities. Any of covering stockpiles would be done using plastic sheeting and held down with sandbags or other heavy objects.

As stated in Response No. 4 above, the contractor selected to perform the retrofit work will be required to develop and implement fugitive dust controls. These controls may include covering each load of CCR removed from the site using tarps built-in to the dump truck, spraying CCR when it becomes dry and fugitive dust is visible, and covering any stockpiles with plastic sheeting and held down using heavy objects, such as sandbags. The contractor will be expected to have fugitive dust control measures readily on hand for implementation upon immediate direction by MWG.

In addition, the contractor will be required to develop a health and safety plan that addresses emergencies and accidents that may occur during the retrofit construction. Activities that will occur during the retrofit construction are not typical operating activities for the CCRSI and the development of any safety and emergency measures are best performed by the selected contractor, who is intimately knowledgeable about the means and methods that will be employed for executing the retrofit. In general, any spilled CCR will be collected, contained, and disposed of in the same manner as the CCR material removed as part of the retrofit construction.

As part of the pre-construction meeting, the dangers associated with CCR will be discussed with the construction crew along with providing a CCR SDS. MWG updated the Safety and Health Plan to include a CCR SDS and the updated plan was included as Attachment 4 to the February 5, 2024 Response. The revised Safety and Health Plan includes in its training program the requirement for contractors and employees to be informed of chemical hazards and hazardous materials, including CCR, which may be present. Specifically, Section 4.0(B)(6) identifies that "CCR may be present in water or as respirable dust" and "CCR may contain heavy metals, such as arsenic, barium, cadmium, chromium, lead, mercury, and selenium". Section 4.0(B)(7) identifies the use of engineering controls, administrative controls, and required PPE.

As stated previously, the contractor executing the retrofit construction will create the necessary Emergency Plan and Safety & Health Plan specific to the means and methods of construction they will employ. The Emergency Action Plan and Safety & Health Plan revised to address comments from IEPA's Initial Operating Permit Application review letter address the applicable portions of 29 CFR 1926 related to the operation of the ABB and the presence of CCR. MWG neglected to include the revised Emergency Action Plan in its February 5, 2024 Response; it is included as Attachment 3 to this response.

30) MWG specifies the methods, materials, and operations that will be implemented to meet the retrofit design specifications in the text of the Application. These specifications are principally stated in Attachment 5-2 of the Application, which is Construction Quality Assurance (CQA) specification for the project (Spec. P-1401). This specification "covers the field and laboratory activities for a [CQA] Contractor to provide assurance and documentation that the Bypass Basin at the Powerton Generating Station is retrofitted in accordance with the General Work (GW) Specification (P-1400), the Design Drawings, and permit requirements." Spec. P-1401, Sect. 011100, Par. 103.1. The CQA Contractor's scope of work includes visual inspections, field tests, and laboratory tests on the various materials to be used in the retrofit project. *See* Spec. P-1401, Sect. 014362 for detailed CQA

specifications and ASTM test methods to be used, including Tables 014362-1 through 014362-7 at the end of that section.

In addition to the CQA scope of work discussed above, additional QA/QC methods and tests are specified in GW Spec. P-1400 provided in Attachment 5-1 of the Application. For example, each material supplier is required to submit material certificates and test reports indicating that the provided materials meet specification requirements. The ASTM test methods to be performed by the material suppliers are also specified. *See* Spec. P-1400, Sect. 319005, Par. 104.3b1 (Structural Fill). *See* Spec. P-1400, Sect. 319005, Par. 104.3c1 (crushed stone surfacing). *See* Spec. P-1400, Sect. 319020, Par. 104.3b5 (HDPE geomembrane). *See* Spec. P-1400, Sect. 319020, Par. 104.3c4 (drainage geocomposite). *See* Spec. P-1400, Sect. 319025, Par. 104.2b2 (geosynthetic clay liner). *See* Spec. P-1400, Sect. 319050, Par. 104.3a1 (Coarse Aggregate Bedding Material). *See* Spec. P-1400, Sect. 319050, Par. 104.3b1 (Sand Filter Layer Material). *See* Spec. P-1400, Sect. 319050, Par. 104.3c1 (Protective Warning Layer Material). *See* Spec. P-1400, Sect. 319050, Par. 104.3d1 (Riprap Bedding Layer Material). *See* Spec. P-1400, Sect. 319050, Par. 104.3e1 (Riprap).

CQA Specification P-1401 ensures that the CQA reports required by Section 845.290 will be prepared for the retrofitted Bypass Basin:

a. Per Sect. 011100, Par. 104.1f1, the CQA Contractor that MWG hires will include a CQA Officer, who will be a professional engineer licensed in the State of Illinois and who will be responsible for implementation of the construction quality assurance work. This complies with Section 845.290(b)(1).

b. Per Sect. 014362, Par. 104.2b2.1, the CQA Officer will be required to prepare a Weekly Summary Report at the end of each week until construction is complete. Per Sect. 014362, Par. 104.2b2.2, the Weekly Summary Report will contain descriptions of the weather, locations where construction occurred during the previous week, materials used, results of testing, inspection reports, and procedures used to perform inspections. MWG will place each Weekly Summary Report in the facility's operating record. This complies with Section 845.290(b)(2).

c. Per Sect. 014362, Par. 104.2b3.1, the CQA Officer will prepare a Retrofit Completion Report that demonstrates the Bypass Basin was retrofitted in conformance with Project Specifications, the Design Drawings, and permit requirements. This report will include certifications that 1) pipe bedding material contains no undesirable objects (complies with Section 845.290(b)(3)(A)); 2) the anchor trench and backfill are constructed to prevent damage to a geosynthetic membrane (complies with Section 845.290(b)(3)(C)); 3) all tears, rips, punctures, and other damage to geosynthetic materials are repaired (complies with Section 845.290(b)(3)(D)); 4) all geomembrane seams are properly constructed and tested in accordance with the manufacturer's specifications (complies with Section 845.290(b)(3)(E)); 5) proper filter material consisting of uniform granular fill, to avoid clogging, is used in construction (complies with Section 845.290(b)(3)(I)); and 6) the filter material, as placed, possesses structural strength adequate to support the maximum loads imposed by the overlying materials and equipment used at the facility (complies with Section 845.290(b)(3)(J)).

d. Per Sect. 011100, Par. 104.1f2, the CQA Officer will supervise and be responsible for all inspections, testing, and other activities required to be implemented as part of the CQA scope of work for the project. This complies with Section 845.290(b)(4).

e. Per Sect. 011100, Par. 104.1f3, the CQA Officer will be present to provide supervision and assume responsibility for performing all inspections of 1) compaction of subgrade materials and 2) installation of the new composite liner system. This complies with Section 845.290(b)(5).

f. Per Sect. 011100, Par. 104.1.f4, if the CQA Officer is unable to be present during specified inspections, the CQA Officer will provided, in writing, 1) the reasons for the CQA Officer's absence; 2) a designation of a person who must exercise professional judgment in carrying out the duties of the CQA Officer-in-Absentia; and 3) a signed statement that the CQA Officer assumes full responsibility for all inspections performed and reports prepared by the designated CQA Officer-in-Absentia during the absence of the CQA Officer. This complies with Section 845.290(b)(6).

g. As a whole, the Design Drawings and Project Specifications (Spec. P-1400 and Spec. P-1401) for retrofitting the Bypass Basin include a comprehensive CQA scope of work to ensure, at a minimum, that construction materials and operations meet design specifications and permit requirements. This complies with Section 845.290(b)(7).

31) See Response No. 3, above.

32) See Response No. 2, above.

33) The preliminary written closure plan for the retrofitted Bypass Basin provided in Attachment 8-2 of the Application was prepared in accordance with Section 845.720(a). Sections 845.720(a)(1)(A) through (F) do not require the preliminary written closure plan to "include an outline of means and methods ***to demonstrate*** that contaminated subsoils have been removed." (Emphasis added.) Section 845.720(a)(1)(B) only requires "a description of the procedures to remove the CCR and decontaminate the CCR surface impoundment in accordance with Section 845.740." In other words, the preliminary written closure plan only needs to describe how the impoundment will be closed, not how decontamination will be verified. For details on the procedures MWG currently plans to use to close the retrofitted Bypass Basin in accordance with Section 845.740, refer to Section 3.0 of the preliminary written closure plan provided in Attachment 8-2 of the Application.

34) 35 Ill. Adm. Code 809 was referenced with respect to the manifest requirements cited in Section 845.740(c)(1)(A)(i). Moreover, Section 3.0 of the preliminary written closure plan for the retrofitted Bypass Basin provided in Attachment 8-2 of the Application does require transportation of CCR to comply with Section 845.740(c):

> "Trucks transporting the CCR materials off-site will carry manifests pursuant to ***35 Ill. Adm. Code 845.740(c)(1)(A)*** and as specified in 35 Ill. Adm. Code 809. In addition, a CCR transportation plan will be prepared in accordance with ***35 Ill. Adm. Code 845.740(c)(1)(B)***…Pursuant to ***35 Ill. Adm. Code 845.740(c)(2)(A)***, [on-site fugitive] dust control measures will include water spray, commercial dust suppressant, or a combination of these.

> Prior to the removal of CCR materials from the retrofitted Bypass Basin, signage will be posted at the Station's entrance warning of the hazards of CCR dust inhalation in accordance with ***35 Ill. Adm. Code 845.740(c)(3)(A)***. Pursuant to ***35 Ill. Adm. Code 845.740(c)(3)(B)***, a written notice will be issued to each of the local governments through which the CCR materials will be transported." (Emphasis added.) Attachment 8-2 of the Application at 3 to 4.

Because the Application is for a retrofit construction permit, the Agency's comment regarding a transportation plan related to MWG's preliminary written closure plan for the retrofitted Bypass Basin is not applicable. Moreover, the only transportation plan that needs to be submitted with a construction permit application is the on-site transportation plan showing "all existing and planned roads in the facility that will be used during the operation of the CCR surface impoundment." Section 845.220(a)(2)(E). The on-site transportation plan for the Bypass Basin is provided in Section 2.5 and shown on Figure 2 in Attachment 2-3 of the Application.

35) MWG disagrees with this comment. The "estimate of the maximum inventory of CCR ever on-site over the active life of the CCR surface impoundment" required by Section 845.720(a)(1)(D) refers to CCR ***stored within*** the CCR surface impoundment and does not include CCR materials used to construct an impoundment's embankments or foundation. Those CCR materials are CCRMUs as defined by U.S. EPA's May 2023 Proposed Rule and are not currently regulated by the Federal CCR Rule or the Illinois CCR Rule.

36) MWG will correct this typographical error for the title of Section 7.0 in the written retrofit plan for the Bypass Basin. The section will be renamed "Amendments to Retrofit Plan."

37) Please refer to the February 5, 2024 Response, Item 9.

38) Please refer to the February 5, 2024 Response, Item 9.

39) Please refer to the February 5, 2024 Response, Item 47.

40) Please refer to the February 5, 2024 Response, Item 48.

41) Please refer to the February 5, 2024 Response, Item 23.

42) Please refer to the February 5, 2024 Response, Item 23.

43) Please refer to the February 5, 2024 Response, Item 51.

44) Please refer to the February 5, 2024 Response, Item 23.

45) Please refer to the February 5, 2024 Response, Item 50.

46) Updates to the noted tables will be made as appropriate.

47) Please refer to the February 5, 2024 Response, Item 54.

48) Please refer to the February 5, 2024 Response, Item 55.

49) Please refer to the February 5, 2024 Response, Items 9 and 56.

50) Please refer to the February 5, 2024 Response, Item 57.

51) Please refer to the February 5, 2024 Response, Item 58.

52) Please refer to the February 5, 2024 Response, Item 59.

List of Attachments

Attachment No.	Description
1	Numbered IEPA Permit Bypass Basin Retrofit Application Review Letter
2	2016 History of Construction
3	Revised Emergency Action Plan, January 2024

Attachment 1

Numbered IEPA Bypass Basin Retrofit Permit Application Review Letter

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 · (217) 782-3397
JB PRITZKER, GOVERNOR
JOHN J. KIM, DIRECTOR

217/782-0610

February 22, 2024

Dale Green
Midwest Generation, LLC
804 Carnegie Center
Princeton, NJ

Re: Powerton Generating Station
Log No. 2021-100029
Bureau ID # W1798010008
Construction Permit to Retrofit Bypass Basin
Review Letter

Mr. Green:

Illinois EPA received your Application for a Construction Permit to retrofit Powerton's Bypass Basin and the supporting documents concerning the above project on July 22, 2022. The application and supporting information, as submitted, are undergoing review by the Illinois EPA, and based upon that review, the following items are offered for your consideration and appropriate action:

General Comments:

1) - Retrofit construction permit application must include a groundwater monitoring program pursuant to all applicable subsections of 35 Ill. Admin. Code 845.630, 845.640, 845.650.

2) - MWG must provide the preliminary written closure plan and the initial post-closure care plan as part of the construction permit application for the retrofit of the By-pass Basin. The construction permit application for the retrofit of the By-pass Basin does not constitute approval of either the final written closure plan or the final written post-closure care plan.

3) - As a condition of leaving the existing synthetic liner in place under Section 845.770(a), the retrofit construction plan must include cover to prevent plume migration from the retrofit embankments that are filled with CCR and the embankments of the original By-pass Basin to the extent they remain in place during operation of the retrofit Bypass Basin. PS-GT-8, drilled and logged in 2005 in the Bypass Basin embankments, according to the Geotechnical Summary Letter dated 2005 contains bottom ash and slag. The CCR in the embankments of the retrofit By-pass Basin must include a final cover system that isolates the embankment materials that include CCR from stormwater infiltration.

4) - The Safety Plan, Emergency Action Plan and Fugitive Dust Control Plan must be updated for construction activities for the Construction Permit application in accordance with 35 IAC 845.530(c)(2), 845.500(b), and 845.520(b).

5) - Section 1.5: Because this is a construction permit application and the embankments of the Bypass Basin are confirmed to have been constructed of CCR at least in part (KPRG, 2005), the stormwater runoff from the construction must be addressed as a part of the permit application.

6) - Section 1.5: This section does not adequately address what happens when flooding breaches the elevation of the embankments and does not provide an elevation of the embankment for the Agency's review.

7) - Section 1.6 and Attachments to Permit Application: The History of Construction prepared by Geosyntec in 2016 must be provided in the Construction Permit Application for review of congruency by the Agency.

8) - Section 1.6.1: The KPRG report dated October 13, 2005 exhibits that CCR comprises the majority of the fill materials for the embankments. The nature of the origin of the fill material is required to be discussed, due to the requirement of removal of contaminated subsoils pursuant to 35 Ill. Admin. Code 845.770(a). A closure construction permit application with a closure alternatives analysis will be required to complete closure at the end of the active life of the retrofit By-pass Basin.

9) - Sections 1.7 and 1.7.1: Sections describing the engineering properties of the embankment fill do not provide known descriptions of the embankment fill which includes slag and bottom ash to a depth of at least 15 feet. (KPRG, 2005).

10) - Section1.7.1: Construction methods must take into consideration that CCR was used to construct the embankments of the Bypass Basin (KPRG, 2005).

11) - Section 2.0 and 8.2: Retrofitting of the CCRSI under Section 845.770 is not the same process or part of the process as closure by removal under Section 845.740. Corrective action is also a different process and may be required in conjunction with either Section 845.740 or Section 845.770.

12) - Section 2.1, Table 2.1-1 and Section 2.2: The CCR characterization does not have adequate explanation of how one or two samples for the entirety of the Bypass Basin CCR is sufficient to comply with Chapter 9 of the SW846 Compendium incorporated by reference under Section 845.150.

13) - Section 2.5: The onsite transportation plan should comply with 35 Ill. Admin. Code 845.740(c)(1)(B)(ii), (iii) noise and entry to Manito Road, (iv) dust suppression measures reference, (v), (vi), and (vii).

14) - Section 5.2: Any structural fill removed from the embankments that is CCR or mixed CCR must be characterized and appropriately disposed . Structural fill placed between the existing synthetic liner and the composite liner must not contain CCR.

15) - Section 7.1.1: The bottom of the Ash Surge Basin seems to extend to at least elevation 452-feet amsl and the Bypass Basin bottom seems to be above elevation 460 feet. However, the basis for this depiction is not provided in the documents that MWG has submitted for the permit application. The bottom of the Ash Surge Basin and the Bypass Basin must be provided. The bottom of the Former Ash Basin intersects the groundwater table and it has surface water standing in it most of the time. The clay seam at Powerton is not continuous and does not provide a confining unit between the sand fill and the sand and gravel underlying the sand fill and/or clay seam. The potentiometric surface and surface water levels in the Illinois River have risen to 452-feet amsl multiple times in the last 10 years at Powerton Station. The potentiometric surface maps must be updated and be consistent between flow maps. Additionally, according to the FEMA Flood Insurance maps, the flood zone that encompasses the Former Ash Basin is elevation 456.9-feet amsl. Currently flow maps are segregated and inconsistent with each other between the figures presented depending on basin.

16) - Section 7.1.2: The US Fish and Wildlife Service Wetlands Mapper shows Freshwater Forested/Shrub Wetlands and Freshwater Emergent Wetlands in an around the CCRSIs at the Powerton Generating Station. This section of the Permit Application must be updated to appropriately address the wetlands that exist here.

17) - Section 7.1.2: The Former Ash Basin lies within a US Fish and Wildlife Service mapped wetland. However, there are no supporting documents to ensure that 35 Ill.. Adm. Code 845. 230(d)(2)(D)(ii) is adhered to.

-

18) - Section 7.0: The Bypass Basin bottom is not provided in a manner that is verifiable. The bottom of the Bypass Basin must be demonstrated to be at the depth that is depicted on cross sections. The potentiometric surface and surface water levels in the Illinois River have risen to 452-feet amsl multiple times in the last 10 years at Powerton Station. MWG must adequately demonstrate that the bottom of the Bypass Basin complies with Section 845.300. If the Bypass Basin cannot meet the requirements of Section 845.300 it cannot be retrofit under Section 845.770.

19) - Section 8: Under Section 845.230(d)(2) (j) and (k) the preliminary written closure plan and the initial written post-closure care plan, respectively, must be submitted as part of the retrofit construction permit application. Closure under 845 Subpart G is subject to a separate construction permit application and is not approved under a retrofit construction permit application.

-

20) - Section 8.3: Retrofitting of a CCRSI pursuant to 35 Ill. Admin. Code 845.770 does not equate to closure by removal in accordance with 35 Ill. Admin. Code 845.740 .

21) - Section 9.1, 9.2 and 9.3 and Attachment 9-2: MWG must monitor the hydrostratigraphic units and evaluate the multiunit groundwater monitoring system to determine impacts of flooding from the Illinois River. The Agency reviews the boring logs and well construction in Attachment 9-2 and determined the following wells are associated with the following units:

- Fill: MW-8 (cross gradient), MW-18 (cross gradient) and possibly MW-19 (upgradient, may have overlying CCR above screen, so not acceptable as an upgradient/background well).
- Clay/silty clay unit: MW-6 (downgradient), MW-10 (cross gradient), MW-12 (cross gradient), MW-14 (cross gradient), MW-15 (cross gradient), and MW-17 (cross gradient)
- Sand and gravel unit: MW-01 (cross gradient), MW-2 (downgradient), MW-3 (downgradient), MW-4 (downgradient), MW-5 (downgradient), MW-7 (cross gradient), MW-9 (upgradient, but has surficial CCR proximate to the well), MW-10 (cross gradient), MW-13 (cross gradient), and MW-16 (upgradient)

22) - Given the aforementioned wells and associated lithologic units, MWG must install and monitor additional wells as follows:

- Fill unit: Upgradient well. Must be installed upgradient of all CCR operations present and past (see comment on background/upgradient wells below). Two downgradient wells must be installed downgradient of the FAB to gauge groundwater fluctuations due to temporal and seasonal changes including Illinois River elevation surges.
- Clay/silty clay unit: Upgradient well. Must be installed upgradient of all CCR operations present and past (see comment on background/upgradient wells below).
- Sand and gravel unit: Upgradient well. Must be installed upgradient of all CCR operations present and past (see comment on background/upgradient wells below).
- Vertical gradient and extent of contamination investigation: At least one location of vertical gradient nested wells must be installed to determine the vertical extent of the groundwater contamination. The vertical gradient wells must be installed north of the Ash Surge Basin. Drilling of initial borehole must include soil classification to a depth of 100-feet pursuant to 35 Ill. Admin. Code 845.620(b)(13).
- Well installation must be conducted pursuant to 77 Ill. Admin. Code 920.170. isolation casing must be installed where appropriate to prevent cross contamination during drilling and well installation.

- The upgradient or background monitoring wells chosen for each CCRSI must comply with Section 845.630(a). The upgradient or background monitoring wells must be as close to the upgradient side of the CCRSI that the background well is meant to monitor with the following conditions:
  - Must not be in CCR.
  - Must be as close to the CCRSI and as far away from similar source material to adequately characterize the Section 845.600(a) constituents that are already present prior to entering the CCRSI groundwater.
  - If the background monitoring well is not hydraulically connected, the geochemical conditions must be similar to those onsite to ensure similar monitoring conditions.

23) - Section 9.1.1: Because MWG is proposing design and construction of retrofit, it would be better suited to discuss the geology of the soils as it pertains to geotechnical engineering applications. In other words, instead of citing USDA sources, MWG must discuss where the glacial till, if any, begins. Glacial till has specific foundational and load bearing capacities that lend to apply to the design. This section is conflicting in that the source for soils is the USDA from 1996. However, according to the Handbook of Illinois Stratigraphy (1975) and the second paragraph there are clays/silty clays/silts that are organic, which is consistent with alluvial silts and clays. Due to the proximity to the Illinois River, the geologic maps of the Handbook of Illinois Stratigraphy showing alluvium along the area that encompasses Powerton correlate with the borings that have been collected at Powerton. Additionally, the known geomorphologic processes that occur around the Illinois River will cause more alluvial processes over time thus confirming that alluvium deposits and erosion will occur in the future. MWG must provide discussion of these facts in relation to the Bypass Basin.

24) - Section 9.1.2 and Table 9-2: The Agency is unable to review hydraulic conductivities provided by MWG. MWG must provide the data inputs and software outputs/calculations for the values presented in Section 9.1.2 and Table 9-2.

25) - Section 9.1.2: MWG states that there is an ELUC for the Ash Basin, Bypass Basin and Former Ash Basin provided on Figure 9-19. An ELUC cannot be issued by Bureau of Water and any environmental covenant is only one factor to be considered under Section 845.660. An ELUC does not alter the requirements of Part 845.

26) - Section 9.2: See previous comments on downgradient and upgradient well designations and the groundwater monitoring system.

27) - Section 9.3.2: Field parameters must include dissolved oxygen and oxidation reduction potential. Please update to be consistent with the Groundwater Monitoring Plan Addendum and Agency review Attachment comments.

28) - Section 9.3.7: Field and laboratory QA/QC must differentiate between QA measures and QC measures. QA measures refer to using a separate laboratory to ensure that the laboratory results are accurate. QC measures are internal measures such as duplicates, equipment blanks, field blanks, etc. MWG must specify the number or percentage of each type of QC samples that will be collected during each sample event. MWG must also specify the number or percentage of QA samples that will be collected and analyzed during each event.

29) - Attachment 2-3: , Any removal action of CCR from any CCRSI must be addressed in the Fugitive Dust Control Plan, Emergency Action Plan, and Safety Plan pursuant to 35 Ill. Admin. Code 845.500(b), 845.520 and 845.530. See Comment for Section 2.5 regarding a site transportation plan. Specifics of how a release of CCR will be averted, controlled and managed are required under the Emergency Action Plan and Safety Plan. Specifics included in one or more of these documents must comprise of the following:

- Dust control measures applied to equipment moving CCR anywhere within the facility property boundaries (i.e. covers for trucks moving materials, staging areas for placing covers over the truck, methods and equipment to be used to cover trucks, etc.)
- Dust control measures including how often and when spraying will occur every day. (i.e. when
- Dust control measures including when and what materials will be used to cover temporary storage piles.
- Dust monitoring, analyses, turn-around times for actions taken in response to air born dust.
- Emergency action planning must include truck roll overs, excavator roll overs, extreme weather events, flooding of the flood plain including the Bypass Basin during construction activities.
- The current EAP, included in the initial operating permit application, does not identify any potential safety emergencies that could occur during operations of the CCRSI and construction of the retrofit. Potential emergencies identified in the EAP Section 1.0 are passive incidents and do not include movement of CCR during operations or after conclusion of operations.
- The current EAP, Section 2.2, does not identify facility specific corrective actions to be taken in an emergency. The corrective action required at the time of the discovery of any physical spill of CCR solids outside of the CCRSI must be collection, containment and disposal consistent with Part 845. Corrective action for spills involving fluids from the operation of vehicles or equipment inside the CCRSI and outside the CCRSI must also be addressed specifically pursuant to 29 Ill. Admin. Code 430.

- Safety plans for construction projects must be updated for construction activities for the Construction Permit application in accordance with 35 IAC 845.530(c)(2), 845.500(b), and 845.520(b). Hazards must be identified. Identification of hazard mitigation is required. The safety plan must include engineering controls, institutional controls and PPE for the work to be completed.

- Safety plans must include a summary of constituents in the CCR that are hazardous to human health, acute and chronic symptoms of exposure, action levels, institutional controls, engineering controls and other safety measures that are currently in place and when other measures are to be implemented.

- Please note that silica is an air born carcinogen and must be characterized for the purpose of an SDS or in the safety plan/emergency action plan and is not reported in Attachment 2-1 or anywhere else within the retrofit permit application submittal.

- whiConstruction permits must have separate emergency action plans and safety plans to adequately meet safety regulations and training requirements for construction activities. For the purpose of permitting the activity, MWG must provide details required by 35 Ill. Admin. Code 845.500, 845.520 and 845.530 which require adherence to 29 CFR 1926.

30) - Attachment 5-1: CQA reports for the construction must include all applicable items listed in 35 IAC 845.290. MWG must specify, in the text of the Permit Application, the methods, materials and operations that are being implemented to meet the design specifications. MWG must provide the specific QA and QC methods, including ASTM methods, will be utilized for the construction quality assurance program during the retrofit construction. During construction, MWG must document and provide weekly CQA reports in accordance with 35 IAC 845.290.

31) - Attachment 8-2: Please see third General Comment.

32) - Attachment 8-2, Section 3.0: All CCR surface impoundments closing by removal are subject to 35 Ill. Admin. Code 845.740. This construction permit application is for the retrofit of the Bypass Basin under Section 845.770. The construction permit application for retrofitting a CCR surface impoundment requires the inclusion of the preliminary written closure plan, but approval of a retrofit construction permit does not approve closure as presented in the preliminary written closure plan.

33) - Attachment 8-2, Section 3.0: The Preliminary Closure Plan must include an outline of means and methods to demonstrate that contaminated subsoils have been removed.

34) - Attachment 8-2, Section 3.0: MWG must change the requirements for transportation of the CCR to comply with 35 Ill. Admin. Code 845.740(c) instead of 35 Ill. Admin. Code 809.201. The Transportation Plan must be submitted with the Retrofit construction permit application. Also see Comment Attachment 2-3.

35) - Attachment 8-2, Section 4.0: Estimate of maximum inventory of CCR must include CCR underlying the liner. MWG may either use the existing borings with CCR described in the boring logs from the KPRG Geotechnical Summary Letter dated October 13, 2005 or collect analytical data to determine the estimated bottom of CCR contaminated soils at the Bypass Basin.

36) - Attachment 8-1 and 8-2: Attachment 8-1 Section 7.0 is incorrect. Changes to the retrofit plan do not change a closure plan. The Section must be renamed "Amendments to Retrofit Plan". Closure plans must be amended under Section 845.720(a) as described in Attachment 8-2.

37) - General Comment, Attachment 9-1, 9-2, 9-3, 9-4, 9-5 and 9-0: Description of any structures that may or may not impede groundwater flow between the Illinois River and tributaries and the CCRSIs. Description of any structures that impede groundwater flow at any other location onsite to an offsite location.

38) - General Comment, Attachment 9-1, 9-2, 9-3, 9-4, 9-5 and 9-0: field monitoring parameters and field procedures must be conducted in accordance with EQASOP-GW4, Low Stress Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells and all inorganic constituents collected must be collected as total recoverable metals pursuant to 35 Ill. Admin. Code 845.640(i).

39) - Attachment 9-0, Figure 9-1, 9-10 to 9-17: MWG must update the Monitoring well map with designations of wells installed in separate units or provide multiple maps for the monitoring well network in each unit.

40) - Attachment 9-0, Figure 9-8: MWG must update the hydrograph of groundwater elevations to discern between the hydrostratigraphic units in accordance with the aforementioned comments on the multi-unit groundwater monitoring system.

41) - Attachment 9-0 , Figures 9-10, 9-11, 9-12, 9-13, 9-14, 9-15, 9-16, and 9-17: Surface water elevations in Lost Creek along the east side of the CCRSIs must be monitored during sampling events at the site. A staff gage must be installed in the western drainage ditch.

42) - Attachment 9-0, Figures 9-10, 9-11, 9-12, 9-13, 9-14, 9-15, 9-16, and 9-17: Surface water elevation data from the Illinois River must be accounted for and interpreted on potentiometric surface maps for the purpose of depicting the surface water groundwater interaction and potential for releases of groundwater directly to surface water.

43) - Attachment 9-0, Figure 9-18: Constituents remaining from the previously approved GMZ under Part 620 must be addressed as part of the request to terminate post-closure care under Section 845.780(e).

44) - Attachment 9-0, Tables: MWG must add a table or graph exhibiting the USGS staff gage data for the preceding 3 years. The USGS staff gage USGS 05568500 Kingston Mines, Illinois is closest to the facility.

45) - Attachment 9-0, Table 9-2: MWG must update groundwater flow for temporary directional changes due to Illinois River flooding.

46) - Attachment 9-0, Table 9-4 and 9-5: MWG must update for well designations and new wells installed in accordance with previous comments on the multi-unit groundwater monitoring system.

47) - Attachment 9-1: Well location map must be provided and any available elevation data associated with the specific wells presented must be provided for review of Attachment 9-1.

48) - Attachment 9-2: Boring log and well location map must be provided and any available elevation data must be included for review to be conducted.

49) - Attachment 9-3: Groundwater analytical data must be determined using laboratory reports and chains of custody to be of total recoverable metals and not filtered at any point during the field collection and laboratory analysis.

50) - Attachment 9-5: MWG must revise the GWPS to adhere to the 35 Ill. Admin. Code 845.640(f)(1). Trend or prediction limits cannot be used when Statistically Significant Increases (SSIs) are being calculated for each specific constituent. MWG must choose SSIs and a mean or median value for the background wells/35 Ill. Admin. Code 845.600(a)(1) GWPS or trend/prediction limit and comparison of each individual constituent value from each sampling event must be compared to the trend/prediction limit/35 Ill. Admin. Code 845.600(a)(1) GWPS, whichever is higher.

51) - Attachment 9-5, Section 2.1: Outlier analysis cannot be performed on any data set that has less than 32 samples that have been verified as sampled pursuant to 35 Ill. Admin. Code 845.640 criteria and groundwater flow direction in the same direction for all samples being analyzed.

52) - Attachment 9-5: MWG must revise the GWPS to adhere to the additional guidance provided to MWG on background wells and verify that the GWPS statistics were conducted in accordance with EPA QA/G-9S, Data Quality Assessment: Statistical Methods for Practitioners.

Should you have any questions or comments regarding the above, please contact Mark E. Liska at 217/524-3262 or at the above address.

As Illinois EPA completes our technical review of the construction retrofit permit application, we will communicate any further concerns that we identify with you.

Sincerely,

Darin E. LeCrone, P.E.
Manager, Permit Section
Division of Water Pollution Control

DEL:MEL:2021-100029 Bypass Retrofit Review.docx

cc: Hydrogeologic Compliance Unit/Groundwater Section
Peoria Region
Records Unit

Attachment 2

2016 History of Construction

Geosyntec consultants

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HISTORY OF CONSTRUCTION
ASH SURGE BASIN AND BYPASS BASIN
POWERTON STATION
OCTOBER 2016

Geosyntec Consultants (Geosyntec) prepared this history of construction report for the Ash Surge Basin and Bypass Basin located at the Powerton Station (Site) in Pekin, Illinois, which is owned and operated by Midwest Generation LLC (Midwest Generation). This history of construction report addresses the requirements of the Coal Combustion Residuals (CCR) Rule codified in the Code of Federal Regulations Title 40, Part 257, Subpart D. These regulations were published in the Federal Register on 17 April 2015 and became effective on 19 October 2015. This report identifies and addresses the specific requirements of §257.73(c) of the CCR Rule regarding preparing a history of construction report for CCR surface impoundments. Specifically, this report provides the history of construction through 17 October 2016 for the Ash Surge Basin and Bypass Basin.

This report was prepared under the direction of Ms. Jane Soule, P.E., and was reviewed in accordance with Geosyntec's internal review policy by Mr. Robert White of Geosyntec.

1. CCR Rule Requirements for History of Construction

History of construction requirements for existing CCR surface impoundments are included in the structural integrity criteria presented in §257.73 of the CCR Rule. The preamble of the CCR Rule (Page 21380) states that the history of construction for an existing CCR impoundment (in this case, the Ash Surge Basin and Bypass Basin) is required to include information only to the extent available and that only factual documentation, not anecdotal or speculative information, is to be included. Additionally, the preamble states that no new information should be generated to satisfy the requirements of §257.73(c).

2. History of Construction

2.1 Owner and Unit Identification - §257.73 (c)(1)(i)

Owner and unit identification for the Ash Surge Basin and Bypass Basin are presented in Table 1 below.

Table 1: Owner and Unit Identification

UNIT NAME	OWNER/OPERATOR	IDENTIFICATION NUMBER
Ash Surge Basin	Midwest Generation 804 Carnegie Center Princeton, NJ 08540	IL0002232-001
Bypass Basin	Midwest Generation 804 Carnegie Center Princeton, NJ 08540	IL0002232-001

2.2 Unit Location on USGS Map – §257.73 (c)(1)(ii)

The Site is located south of the Illinois River in the Pekin, Illinois. Figure 1 presents the location of the Ash Surge Basin and Bypass Basin on a 7.5-minute United States Geological Survey (USGS) topographic quadrangle map.

2.3 Purpose of the CCR Units – §257.73 (c)(1)(iii)

2.3.1 Ash Surge Basin

The Ash Surge Basin serves as a settling pond for sluiced CCR and other process waters related to electrical power generation at the Site.

2.3.2 Bypass Basin

The Bypass Basin serves as a settling pond for sluiced CCR and other process waters related to electrical power generation at the Site when the Ash Surge Basin is temporarily out of service for maintenance.

2.4 Name and Size of the Watershed – §257.73 (c)(1)(iv)

The Ash Surge Basin and the Bypass Basin are located in the Pekin Lake – Illinois River subwatershed (HUC12 071300030304), which is approximately 28,847 acres in size (USGS, 2015). However, surface water run-on to the basins is limited to the area within the embankment crests because the basins are constructed with elevated embankments surrounding them.

2.5 Description of Foundation– §257.73 (c)(1)(v)

The Ash Surge Basin and the Bypass Basin were constructed with fill embankments on all sides. Because no formational materials provide lateral structural support for the embankments, the

basins do not contain abutments. The remainder of this section addresses the foundation materials for the basins' embankments.

Information regarding the foundation materials at the Site is derived from geotechnical and hydrogeological investigations and engineering analyses (KPRG, 2005, Patrick Engineering, 2011, Geosyntec, 2016).

2.5.1 Properties of Foundation Materials

Foundation materials in the vicinity of the Ash Surge Basin and Bypass Basin generally consist of an interlayering of sandy and clayey units (KPRG, 2005). Publically available geologic information shows that the Site is underlain by approximately 100 to 125 feet of alluvial sands and gravels with some minor clay (Patrick Engineering, 2011). Logs from wells installed in the embankments of the Ash Surge Basin, as well as borings and cone penetration test (CPT) soundings in the vicinity of the basins, indicate silt and clay layers under the embankment fill (Patrick Engineering, 2011; Geosyntec, 2016). Well logs, boring logs, and CPT soundings show the thickness of the silt and clay layers ranging from 16 to 20 feet with approximately 34 to 43 feet of medium dense poorly graded sand and gravel below (Patrick Engineering 2011, Geosyntec, 2016). One boring and one CPT located east of the Ash Surge Basin indicated the presence of a layer of very hard lean clay below the poorly graded sand and gravel (Geosyntec, 2016).

2.5.2 Engineering Properties of Foundation

For engineering analyses, the foundation materials for the Ash Surge Basin and Bypass Basin were considered to either be clay or sand. Table 2 presents engineering properties for the clay and sand materials at the Site developed for the periodic structural stability and safety factor assessments (Geosyntec, 2016). These engineering properties are based on investigations performed at the Site, published correlations, and laboratory testing of samples collected from foundation soils during the Site investigations. Engineering properties were not developed for the very hard lean clay layer due to its relative depth below the ground surface and negligible contribution to the slope stability analyses.

Table 2: Foundation Material Engineering Properties

MATERIAL	UNIT WEIGHT (PCF)	DRAINED FRICTION ANGLE (DEGREES)	EFFECTIVE COHESION (PSF)	UNDRAINED SHEAR STRENGTH (PSF)
Clay	115	32	25	600
Sand	125	32	0	--

2.6 Description of the Materials, Methods, and Dates of Construction - §257.73 (c)(1)(vi)

The following sections describe the type, size, range, and physical and engineering properties of the materials used in constructing each zone or stage of the Ash Surge Basin and Bypass Basin, the method of site preparation and construction of each zone of the unit, and the approximate dates of construction of each successive stage of construction of the unit to the extent the information is available.

Information presented in the following sections is based on available construction drawings (NUS, 1978 and NUS, 1980) and subsequent investigations at the site. No as-built construction drawings or construction completion reports detailing the actual materials and methods used for the original construction of the basins were available for this report.

2.6.1 Ash Surge Basin

Based on the available construction drawings (NUS, 1978), embankments for the Ash Surge Basin were designed to be constructed using compacted fill. Additional detail of the compacted fill is included in prior investigations at the site (Patrick, 2011 and Geosyntec, 2016). The top of the embankment was designed to be 20 feet wide and have a gravel surfaced access road (NUS, 1978). The maximum height of the embankment is approximately 26 feet (measured from crest to downstream toe) in the northeast corner of the basin.

Interior embankments were designed at an inclination of 3H:1V (horizontal:vertical) and were originally lined with a geomembrane (Hypalon) liner (NUS, 1978). However, as-built subgrade topography from liner replacement construction in 2013 show interior slopes are inclined at approximately 4H:1V (NRT, 2014). The impoundment floor and portions of the slopes, including the southern slope below the inlet distribution trough, were lined with a Poz-O-Pac™ liner system to be installed in two 6-inch lifts (NUS, 1978). A description of the Poz-O-Pac™ liner system is not included in the Construction Drawings for the Ash Surge Basin, but is included in information provided from the available construction drawings for the Bypass Basin (NUS, 1980). In 2013, the membrane liner (and limited portions of the Poz-O-Pac liner near the outlet weir) were removed and replaced with a high-density polyethylene (HDPE) geomembrane liner (NRT, 2014). Exterior slopes were designed at 3H:1V or flatter.

2.6.2 Bypass Basin

A description of the embankment fill that was specified for the Bypass Basin is included in the available construction drawings for the Bypass Basin (NUS, 1980). Fill was specified to be placed and compacted in loose lifts not to exceed 9 inches and compacted to 95 percent relative compaction when compared to a maximum dry density obtained from a Modified Proctor test (NUS, 1980). Embankment construction for the Bypass Basin involved building the southern and

eastern embankments because the northern and western embankments are shared with previously constructed surface impoundments (CCR and non-CCR). The design width for the top of the embankment ranged from 12 to 18 feet and the maximum slope height is approximately 24 feet on the west side of the basin where the embankment is shared by the East Roof and Runoff Basin.

Interior embankments for the Bypass Basin were designed at an inclination of 3H:1V and were originally lined with a membrane (Hypalon) liner. The impoundment floor was lined with a Poz-O-Pac™ liner system (as described previously). In 2010, the original liner was removed and replaced with an HDPE geomembrane liner (NRT, 2011). Exterior slopes were designed at 2.5H:1V or flatter (NUS, 1980).

2.6.3 Engineering Properties

Engineering properties for the Embankment Fill used for the design and construction of the Ash Surge Basin and Bypass Basin embankment materials were not available at the time of this report. However, engineering properties were estimated for the Embankment Fill for use in the factor of safety assessment performed for the basins in accordance with the CCR Rule. The estimated engineering properties were based on investigations performed at the Site, published correlations, and laboratory testing of embankment materials and are presented in Geosyntec (2016) and reproduced in Table 3.

Table 3: Embankment Fill Engineering Properties

MATERIAL	UNIT WEIGHT (PCF)	DRAINED FRICTION ANGLE (DEGREES)	EFFECTIVE COHESION (PSF)
Embankment Fill	125	35	25

2.6.4 Construction Dates

Exact dates for construction of the Ash Surge Basin embankments, original liner system, and appurtenant structures are unknown; however, construction drawings were approved for construction in December 1978 (NUS, 1978). Replacement of the original liner system for the Ash Surge Basin was completed in 2013 (NRT, 2014).

Exact dates for construction of the Bypass Basin embankments, original liner system, and appurtenant structures are also unknown; however, construction drawings were approved for construction in June 1980 (NUS, 1980) and indicate that construction of the Ash Surge Basin was complete prior to design of the Bypass Basin. Replacement of the original liner system for the Bypass Basin was completed in 2010 (NRT, 2011).

2.7 Drawings - §257.73 (c)(1)(vii)

Available construction drawings relevant to the design, construction, operation, and maintenance of the Ash Surge Basin and the Bypass Basin are included in Appendix A and Appendix B, respectively. Appendix A-1 includes the available construction drawings for the Ash Surge Basin (NUS, 1978) and Appendix A-2 includes the construction record drawings for the liner replacement activities conducted in 2013 (NRT, 2014). Appendix B-1 includes the available construction drawings for the Bypass Basin (NUS, 1978) and Appendix B-2 includes the construction record drawings for the liner replacement activities conducted in 2010 (NRT, 2011).

2.8 Instrumentation - §257.73 (c)(1)(viii)

Instrumentation monitored for operation of the Ash Surge Basin and Bypass Basin includes a water level monitoring system. The water level monitoring system includes an ultrasonic level detector located in the pump house sump north of the Ash Surge Basin which is connected to contactors that control the pumps to maintain operational water levels in the basins.

2.9 Area-Capacity Curve - §257.73 (c)(1)(ix)

Area-capacity curves for the Ash Surge Basin and the Bypass Basin are included as Figure 2.

2.10 Spillway Description and Calculations - §257.73 (c)(1)(x)

A concrete spillway is located along the eastern perimeter of the Ash Surge Basin. The spillway is constructed of two 4.5-foot wide concrete box culverts beneath the perimeter access road (NUS, 1978). A concrete apron is located east of the box culvert and rip rap is located downstream of the apron. Calculations for the original design of the Ash Surge Basin spillway were not available at the time of this report.

The Bypass Basin includes a corrugated metal overflow pipe located along the northern interior slope of the basin that extends approximately 40 feet northward beneath the access road into the Ash Surge Basin. This overflow pipe includes a 5-foot diameter corrugated metal pipe vertical riser which connects to a 30-inch diameter concrete pipe that extends northward within the embankment between the Bypass and Ash Surge Basins and discharges onto the concrete apron on the southern slope of the Ash Surge Basin. Calculations for the original design of the Bypass Basin overflow pipe were not available at the time of this report.

2.11 Construction Specifications and Provisions for Surveillance, Maintenance and Repair - §257.73 (c)(1)(xi)

The only construction specifications available for this report are the HDPE geomembrane specifications for the liner replacement projects performed in 2010 and 2013 for the Bypass Basin and Ash Surge Basin, respectively. Generally, the HDPE geomembrane specifications identify that an HDPE, white, 60-mil, textured geomembrane be used for the projects. They also identify deployment and seaming requirements, quality control procedures, and requirements for materials placed above the geomembrane. The geomembrane specifications are included in Appendices C and D for the Ash Surge Basin and Bypass Basin, respectively.

As part of the 2010 and 2013 liner replacement projects, warning posts were installed at the toe of interior basin slopes above the geomembrane liner system. These posts are utilized as a visual guide to identify the toe of slope during CCR removal operations to limit potential damage to the liner system.

2.12 Record of Any Structural Instability - §257.73 (c)(1)(xii)

Based on our discussions with Site staff and review of the construction documentation provided herein, there are no records or knowledge of structural instability for the Ash Surge Basin and the Bypass Basin.

3. References

Geosyntec, 2016. Soil Properties Calculation, Ash Surge Basin and Bypass Basin, Powerton Station. October.

KPRG and Associates, Inc., 2005. Geotechnical Analysis of Soil Surrounding Settling Basins/Ponds, KPRG Project No. 15805, October.

Natural Resource Technology (NRT), 2011. Construction Documentation Transmittal – Metal Cleaning Basin and Bypass Basin Liner Replacement, dated 27 June 2011.

NRT, 2014. Construction Documentation Transmittal – Ash Surge Basin Liner Replacement, Midwest Generation Powerton Generation Station, dated 18 July 2014.

NUS Corporation (NUS), 1978. Waste Water Treatment Facility Drawings:

Detail Plan, Ash Surge Basin, Sheet No. 3B-0-2071, redrawn from NUS Dwg. #5080 C 5007 1 of 1, 1978.

Ash Surge Basin, Sections & Details, Sheet No. 3B-0-2075, redrawn from NUS Dwg. # 5080 C 5012 1 of 1, 1978.

Miscellaneous Sections & Details, NUS Dwg. # 5080 C 5015 1 of 2, Rev 2, 1978.
Sludge Weirs, Sections & Details, Sheet No. 3B-0-2089, redrawn from NUW Dwg. #C 5080 C 5506, 1 of 1, 1978.
Ramps & Ash Surge Basin, Overflow Structure, Sheet No. 3B-0-2090, redrawn from NUW Dwg. #5080 C 5507 1 of 1, 1978.
Ash Surge Basin and Limestone Basin Dist. Troughs – Sections, Sheet No. 3B-0-2092, redrawn from NUS Dwg. #5080 C 5509 1 of 1, 1978.
Ash Surge Basin, Wing Wall – Sheet No. 3B-0-2093, redrawn from NUS Dwg dated 1978.
Dewatering Bin Overflow Channel, Sections & Details, Sheet No. 3B-0-2094, redrawn from NUS Dwg # 5080 C 5511 1 of 1, 1978.
Ash Surge Basin, Sump – Soil Profile, Sheet No. 3B-0-2106, redrawn from NUS Dwg # 5080 C 5586 1 of 1, 1978.
Site Plan, East Roof & Yard Runoff Basin, Sheet No. 3B-0-2067, redrawn from NUS Dwg. #5080 C 5002 1 of 1, 1978.

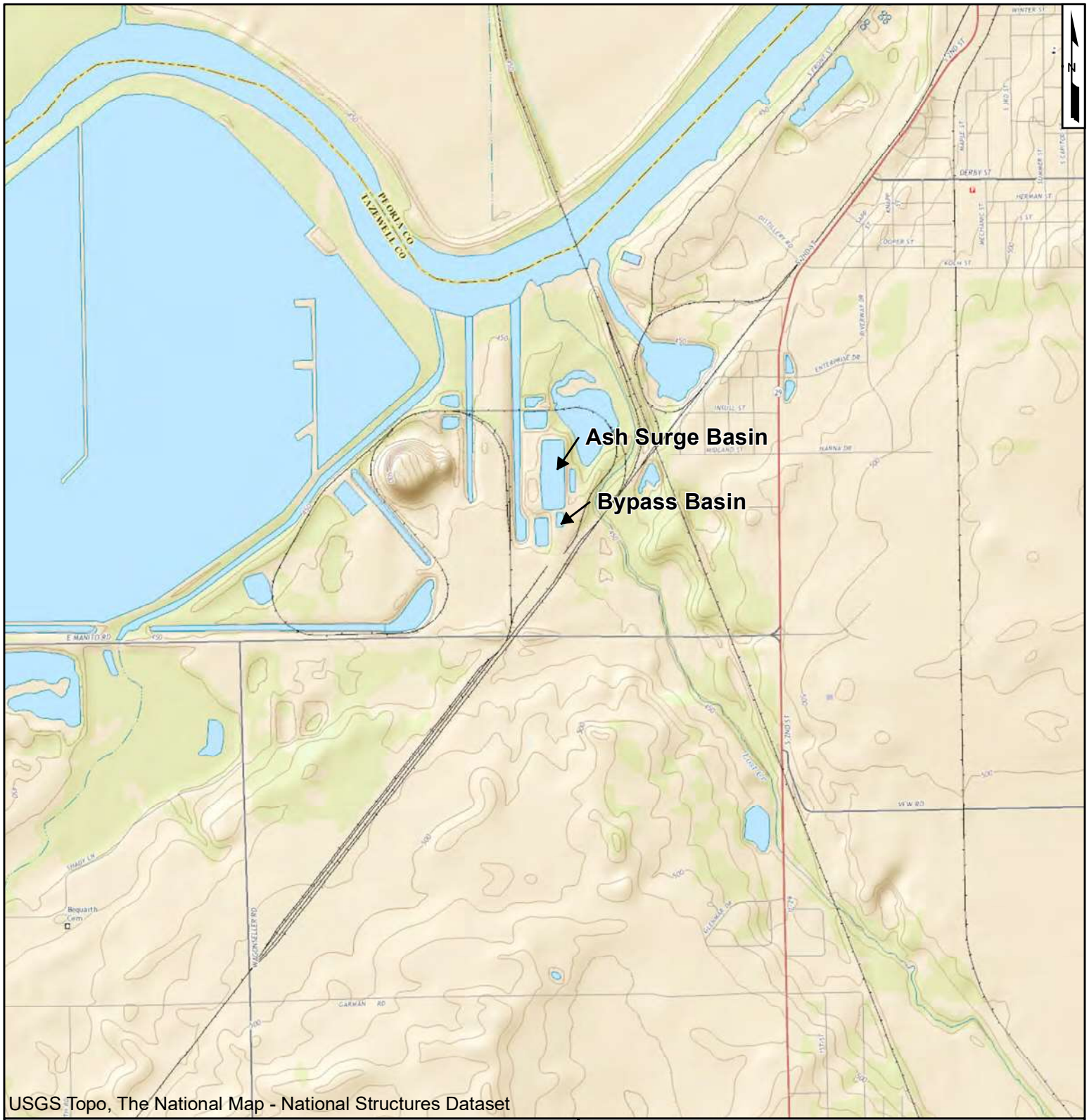
NUS, 1980. Waste Water Treatment Facilities Powerton:
Ash Surge Basin By Pass Plan and Profile, Sheet No. 5295 C 5001.
Ash Surge Basin By Pass Sections and Ramp Profiles, Sheet No. 5295 C 5002.
Ash Surge Basin By Pass Miscellaneous Details, Sheet No. 5295 C 5003.
Ash Surge Basin By Pass Basin Inlet Structure, Sheet No. 5295 C 5501.
Ash Surge Basin By Pass Basin Outlet Structure, Sheet No. 5295 C 5502.
Ash Surge Basin By Pass Basin Miscellaneous Slide Gates, Sheet No. 5295 C 5503.

Patrick Engineering, 2011. Hydrogeological Assessment Report, Powerton Generating Station, Pekin, Illinois, Patrick Project No. 21053.070, February.

USGS (2015). "Watershed Boundary Dataset," accessed via The National Map, http://viewer.nationalmap.gov/viewer/nhd.html?p=nhd, accessed 1 February 2016.

Attachments

Figure 1 – Site Location
Figure 2 – Area-Capacity Curves
Appendix A – Ash Surge Basin Construction Drawings
Appendix A-1 NUS Construction Drawings
Appendix A-2 Liner Replacement Drawings
Appendix B – Ash Surge Basin Construction Drawings



2,000 1,000 0 2,000 Feet

Site Location

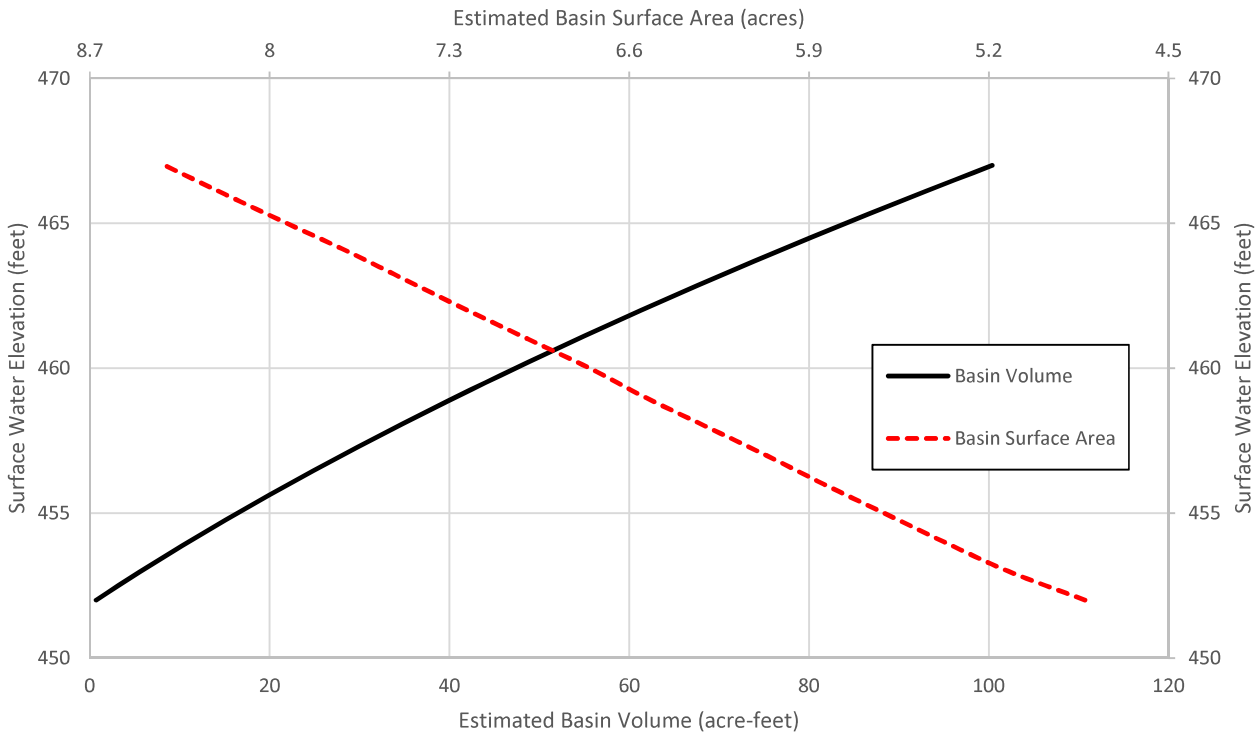
Ash Surge and Bypass Basins
Powerton Station
Pekin, Illinois

Geosyntec consultants

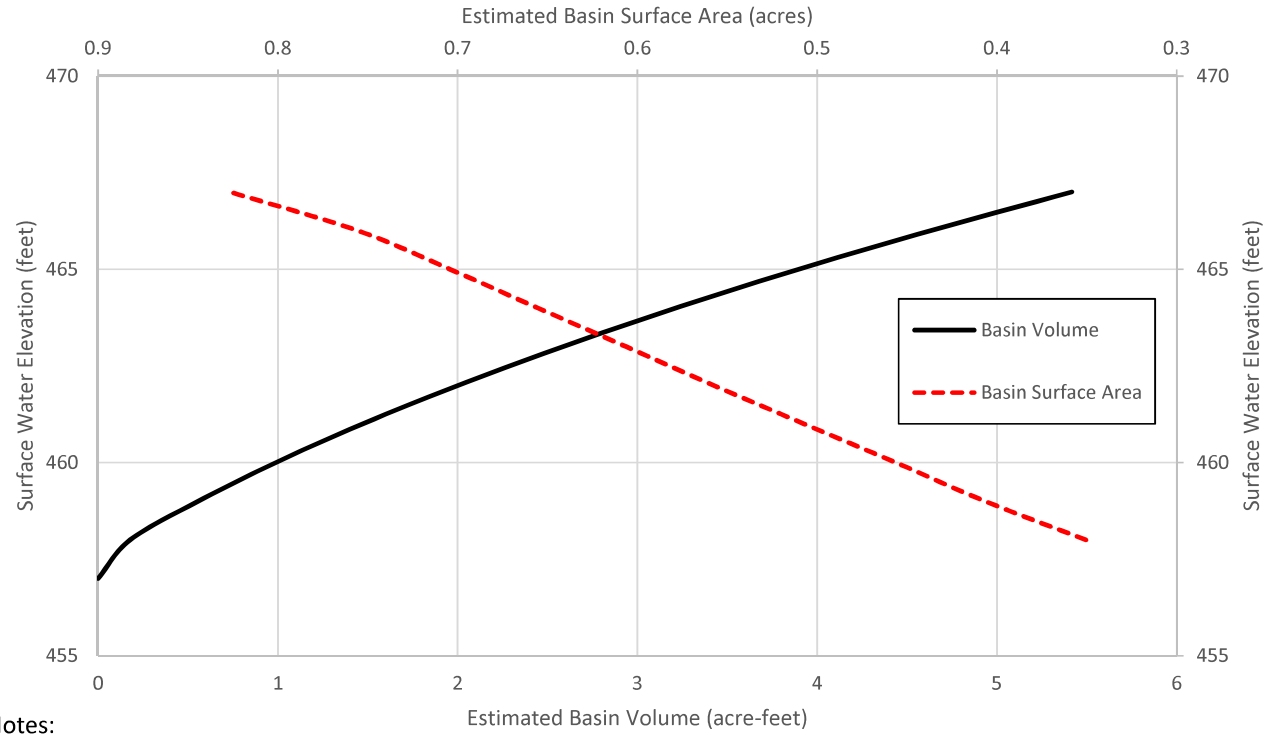
San Diego	October 2016	Figure 1

K:\GIS\PowertonSiteLocation.mxd Name

Ash Surge Basin



Bypass Basin



Notes:
(1) Surface water elevations are NAD83.
(2) Basin volumes are estimated based on as-built information and 2008 site topography.

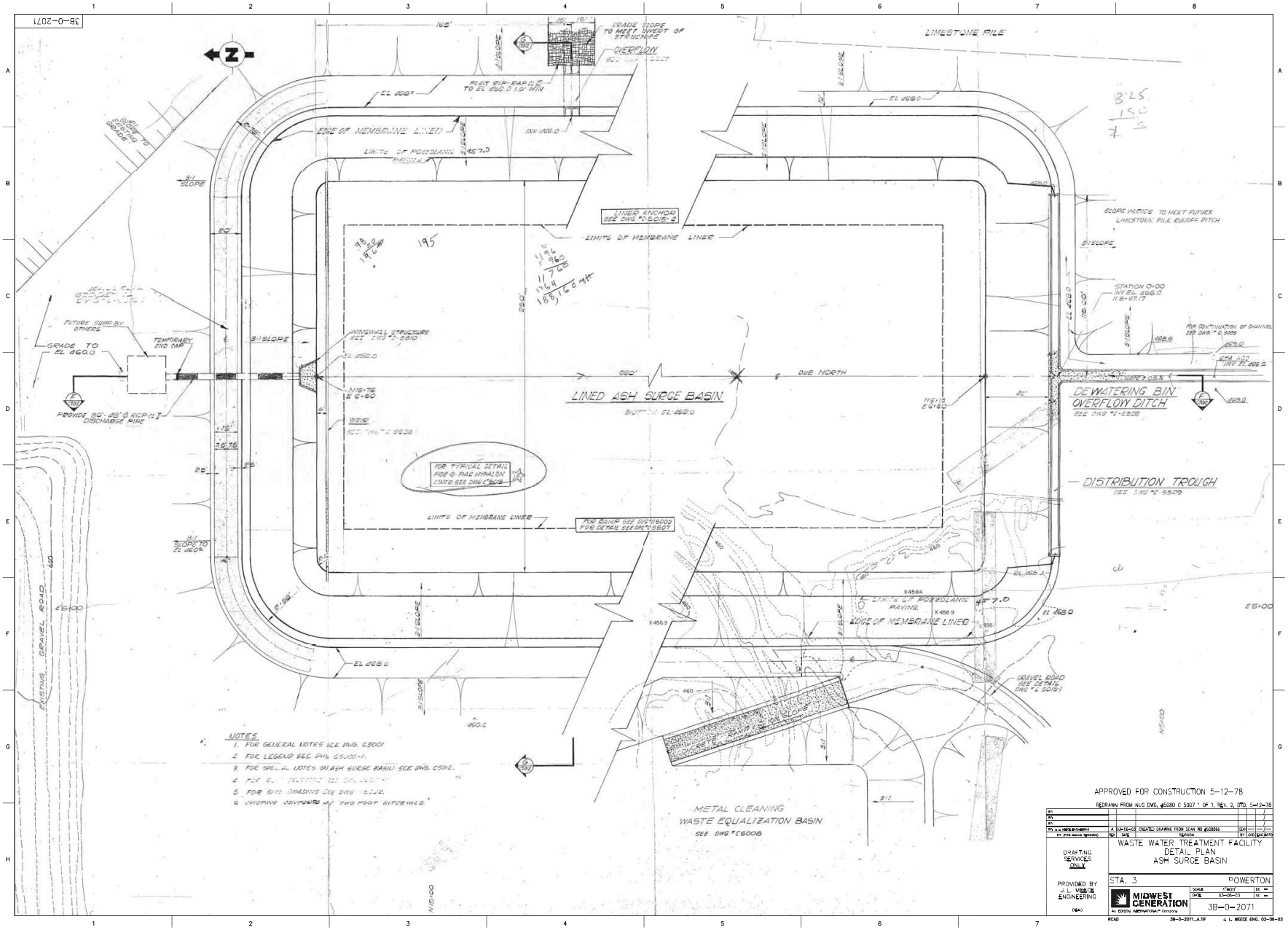
Geosyntec consultants OCTOBER 2016 SW0251-07	AREA-CAPACITY CURVES ASH SURGE & BYPASS BASINS POWERTON STATION PEKIN, ILLINOIS	**FIGURE 2**

APPENDIX A

Ash Surge Basin Construction Drawing

APPENDIX A-1

NUS Construction Drawings



APPROVED FOR CONSTRUCTION 5-12-78

REDRAWN FROM NUS DWG. #50B0 C 5007 1 OF 1, REV. 2, DTD. 5-12-78

2	03-06-03	CREATED DRAWING FROM SCAN NO #208886	SDH	—	—
1	REVISION		BY	CHK'D	APP'D

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WASTE WATER TREATMENT FACILITY
DETAIL PLAN
ASH SURGE BASIN

STA. 3 POWERTON

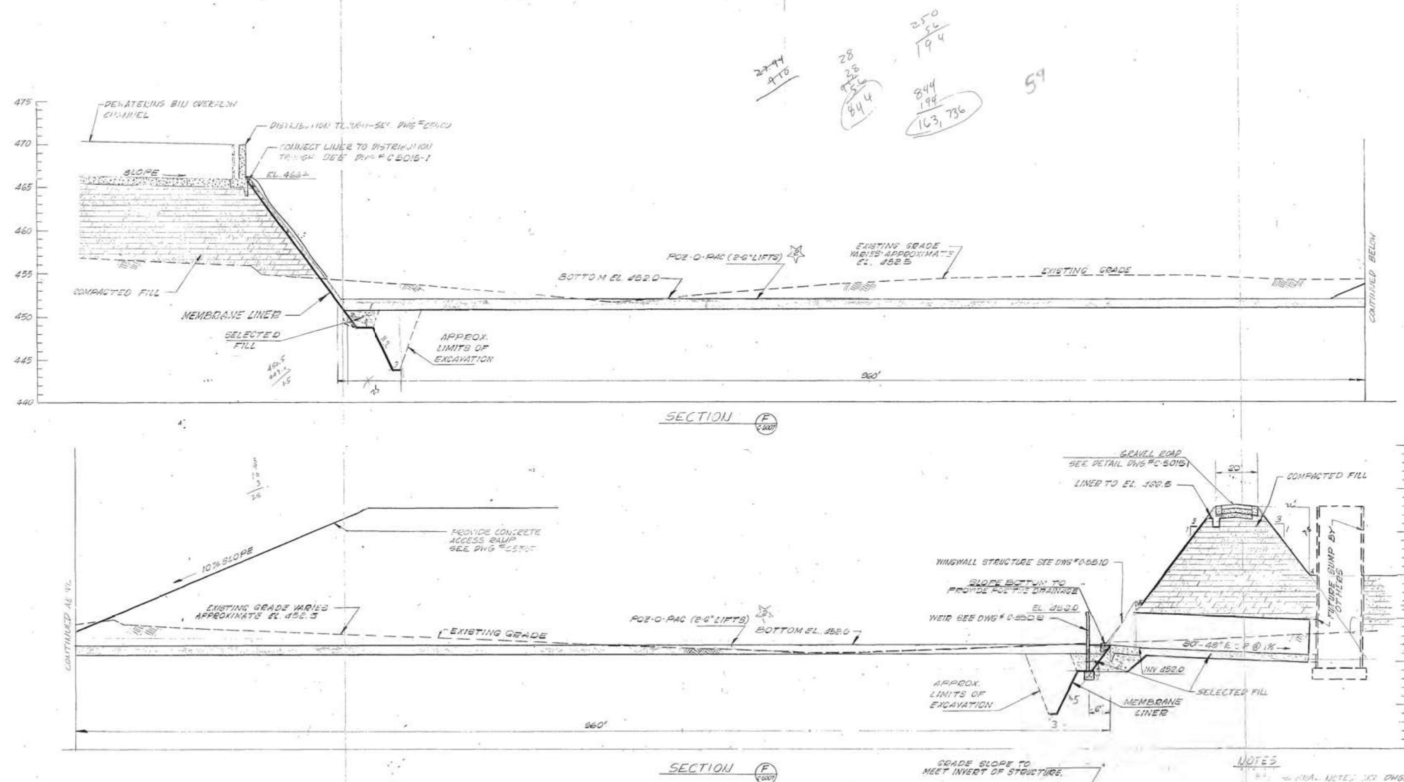
MIDWEST GENERATION
An EDISON INTERNATIONAL Company

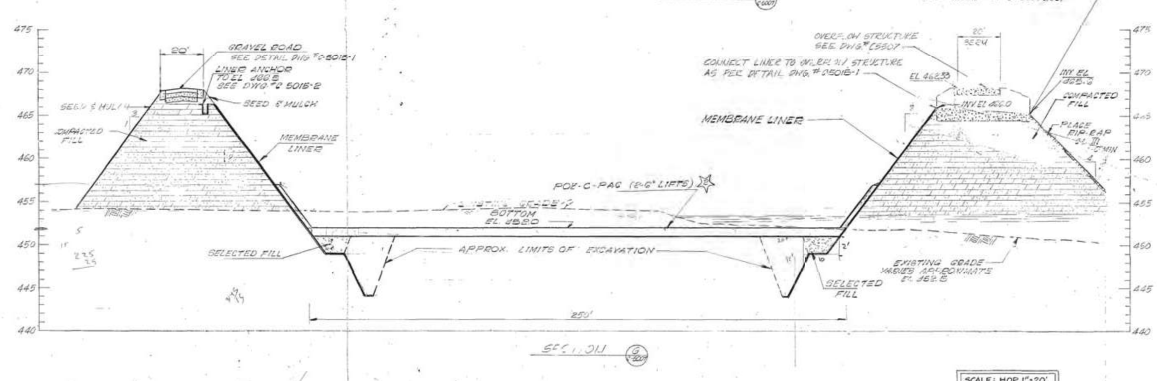
SCALE 1"=20' DC —
DATE 03-06-03 SC —

3B-0-2071

RCAD 3B-0-2071_A.TIF J. L. MEEKE ENG. 03-06-03

3B-0-2075





SCALE: HOR. 1" = 20'
VERT. 1" = 5'

NOTES

1. FOR GENERAL NOTES SEE DWG. C5001.
2. FOR LEGEND SEE DWG. C5001-1.
3. CONTRACTOR TO DEWATER CONSTRUCTION AREA TO EL. 443.0 BY APPROVED METHOD(S) PRIOR TO BASIN CONSTRUCTION.
4. FOR ROAD SECTIONS SEE DWG. # C 5016-1
5. FOR SITE GRADING SEE DWG # C5002.

FOR TYPICAL DETAIL POZ-O-PAC HYPALON LINER SEE DWG # C5018

APPROVED FOR CONSTRUCTION 5-12-78

REDRAWN FROM NUS DWG. #5080 C 5012 1 OF 1, REV. 2, DTD. 5-12-78

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BY:						/
BY:						/
BY:						/
BY: J. L. MEECE ENGINEERING	A	03-06-03	CREATED DRAWING FROM SCAN WO #S08866	SDH	--	--/--
BY: (FIRM MAKING REVISIONS)						

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(SEAL)

WASTE WATER TREATMENT FACILITY
ASH SURGE BASIN
SECTIONS & DETAILS

STA. 3 POWERTON

MIDWEST GENERATION
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SCALE: AS SHOWN | DC: -
DATE: 03-06-03 | SC: -

3B-0-2075

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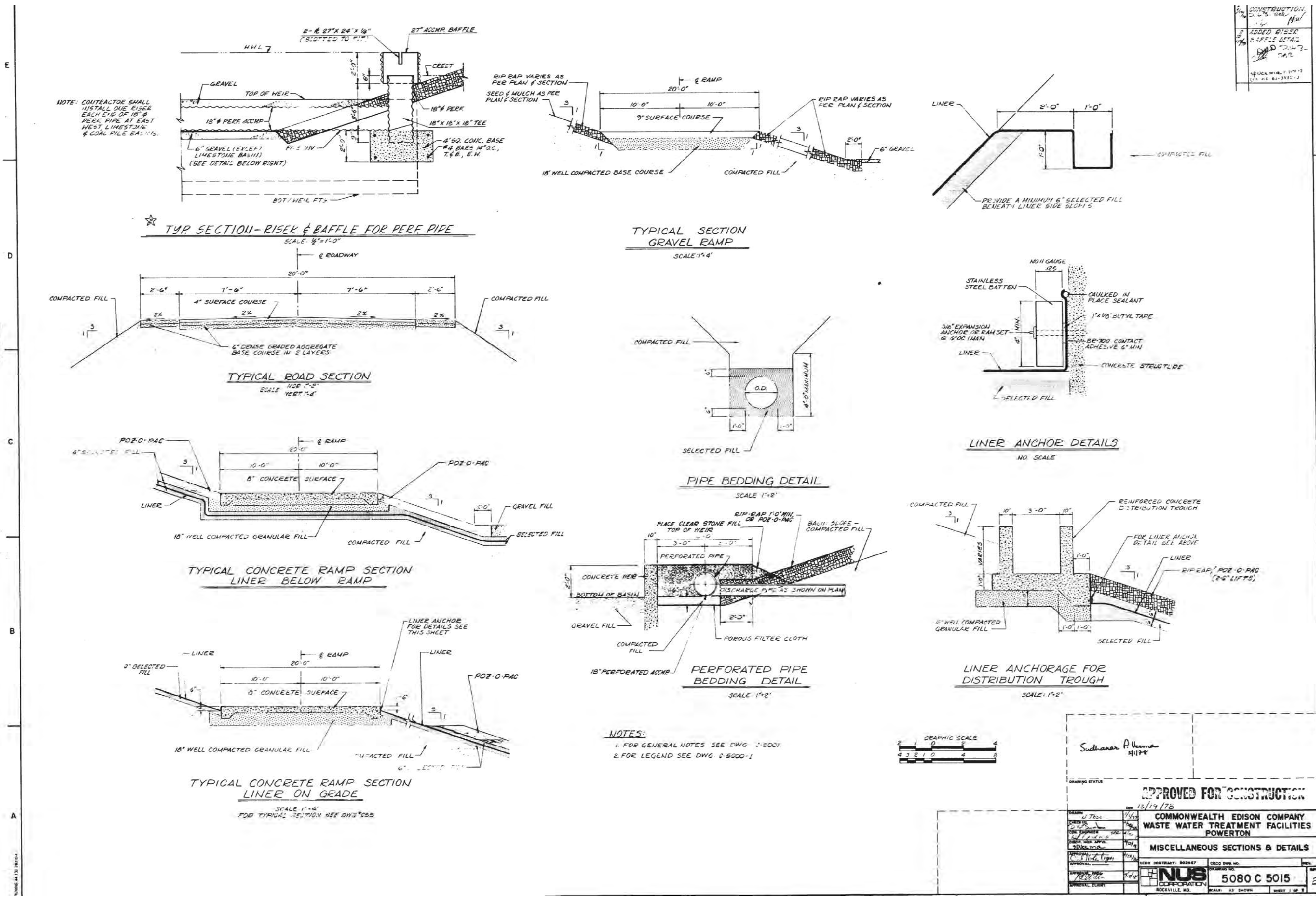
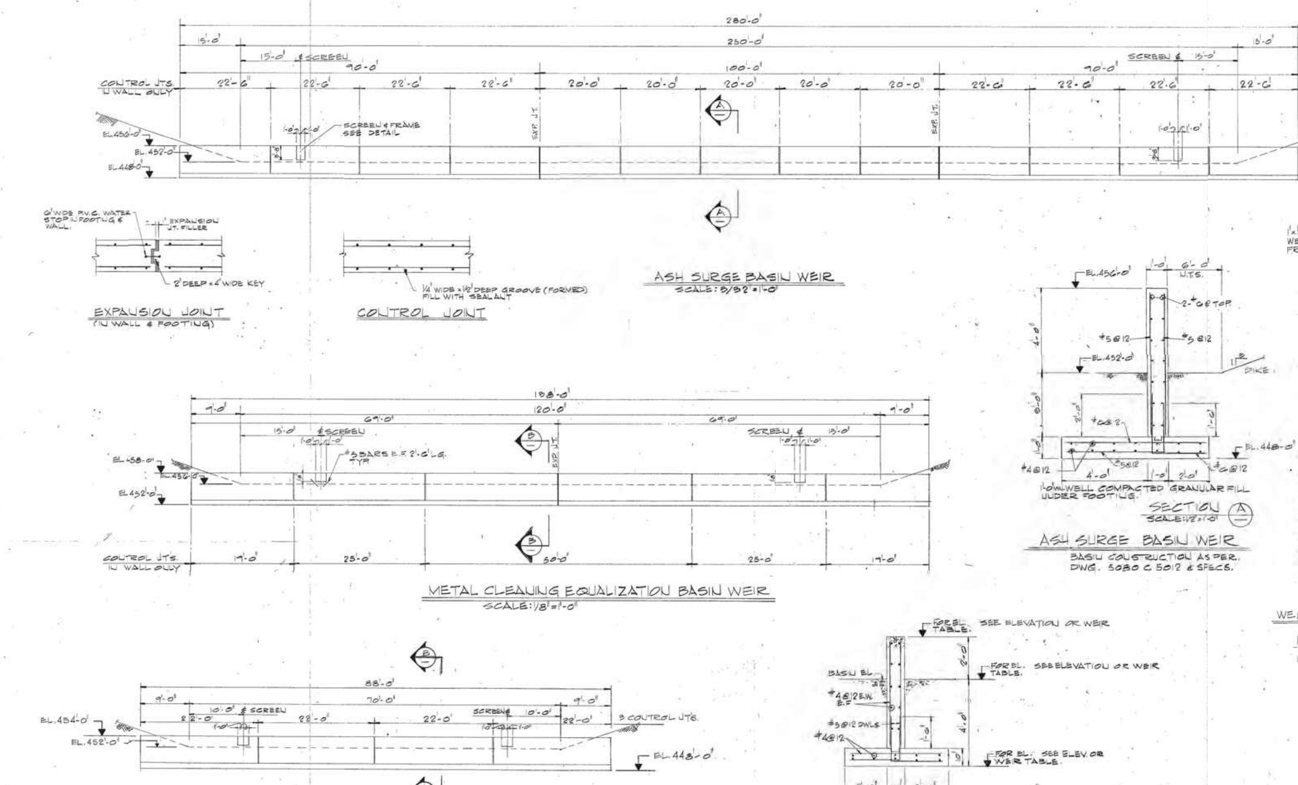
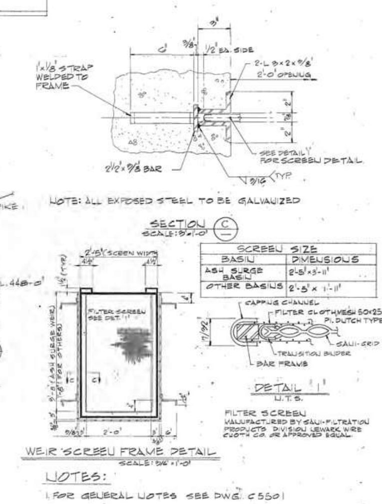


TYP. SECTION - RISER & BAFFLE FOR PERF. PIPE
SCALE: 1/2"=1'-0"
NOTE: CONTRACTOR SHALL INSTALL ONE RISER EACH END OF 18"⌀ PERF. PIPE AT EAST WEST, LIMESTONE & COAL PILE BASINS.
2 - ℄ 27" X 24" X 1/4" (SLOTTED TO FIT)
27" ACCMP BAFFLE
HWL
CREST
GRAVEL
TOP OF WEIR
18"⌀ PERF.
18"⌀ PERF. ACCMP
18" X 18" X 18" TEE
4' SQ. CONC. BASE #4 BARS 12" O.C., T & B, E.W.
6" GRAVEL (EXCEPT LIMESTONE BASIN) (SEE DETAIL BELOW RIGHT)
TYPICAL SECTION GRAVEL RAMP
SCALE: 1"=4'
℄ RAMP
20'-0"
10'-0"
9" SURFACE COURSE
RIP RAP VARIES AS PER PLAN & SECTION
SEED & MULCH AS PER PLAN & SECTION
6" GRAVEL
18" WELL COMPACTED BASE COURSE
COMPACTED FILL
LINER
2'-0"
1'-0"
COMPACTED FILL
PROVIDE A MINIMUM 6" SELECTED FILL BENEATH LINER SIDE SLOPES
TYPICAL ROAD SECTION
SCALE HOR. 1"=8' VERT. 1"=4'
℄ ROADWAY
20'-0"
2'-6"
7'-6"
7'-6"
2'-6"
4" SURFACE COURSE
2%
COMPACTED FILL
6" DENSE GRADED AGGREGATE BASE COURSE IN 2 LAYERS
PIPE BEDDING DETAIL
SCALE 1"=2'
COMPACTED FILL
O.D.
4'-0" MAXIMUM
SELECTED FILL
LINER ANCHOR DETAILS
NO SCALE
NO 11 GAUGE .125
STAINLESS STEEL BATTEN
CAULKED IN PLACE SEALANT
1" X 1/8" BUTYL TAPE
3/8" EXPANSION ANCHOR OR RAM SET @ 6" OC (MAX)
BR-700 CONTACT ADHESIVE 6" MIN
LINER
CONCRETE STRUCTURE
SELECTED FILL
TYPICAL CONCRETE RAMP SECTION LINER BELOW RAMP
POZ-O-PAC
℄ RAMP
20'-0"
10'-0"
8" CONCRETE SURFACE
LINER
GRAVEL FILL
SELECTED FILL
18" WELL COMPACTED GRANULAR FILL
COMPACTED FILL
PERFORATED PIPE BEDDING DETAIL
SCALE 1"=2'
RIP-RAP 1'-0" MIN. OR POZ-O-PAC
PLACE CLEAR STONE FILL TOP OF WEIR
BASIN SLOPE - COMPACTED FILL
PERFORATED PIPE
CONCRETE WEIR
BOTTOM OF BASIN
DISCHARGE PIPE AS SHOWN ON PLAN
GRAVEL FILL
COMPACTED FILL
POROUS FILTER CLOTH
18" PERFORATED ACCMP
LINER ANCHORAGE FOR DISTRIBUTION TROUGH
SCALE: 1"=2'
REINFORCED CONCRETE DISTRIBUTION TROUGH
FOR LINER ANCHOR DETAIL SEE ABOVE
LINER
RIP RAP, POZ-O-PAC (2-6" LIFTS)
12" WELL COMPACTED GRANULAR FILL
SELECTED FILL
VARIES
3'-0"
TYPICAL CONCRETE RAMP SECTION LINER ON GRADE
SCALE 1"=4'
FOR TYPICAL SECTION SEE DWG #055
LINER ANCHOR FOR DETAILS SEE THIS SHEET
6" SELECTED FILL
18" WELL COMPACTED GRANULAR FILL
NOTES:
1. FOR GENERAL NOTES SEE DWG. 5000
2. FOR LEGEND SEE DWG. 5000-1
GRAPHIC SCALE
APPROVED FOR CONSTRUCTION
12/14/78
COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON
MISCELLANEOUS SECTIONS & DETAILS
NUS CORPORATION
ROCKVILLE, MD.
5080 C 5015
SCALE: AS SHOWN
CONSTRUCTION
ADDED RISER BAFFLE DETAIL

REFERENCE DRAWINGS	
WEIR LOCATION	CIVIL DWG. NO.
ASH SURGE BASIN	5080 C 5007
METAL CLEANING	5080 C 5008
LIMESTONE BASIN	5080 C 5008
WEST YARD BASIN	5080 C 5018
EAST ROOF & YARD BASIN	5080 C 5005
COAL PILE	5080 C 5006





NOTES:
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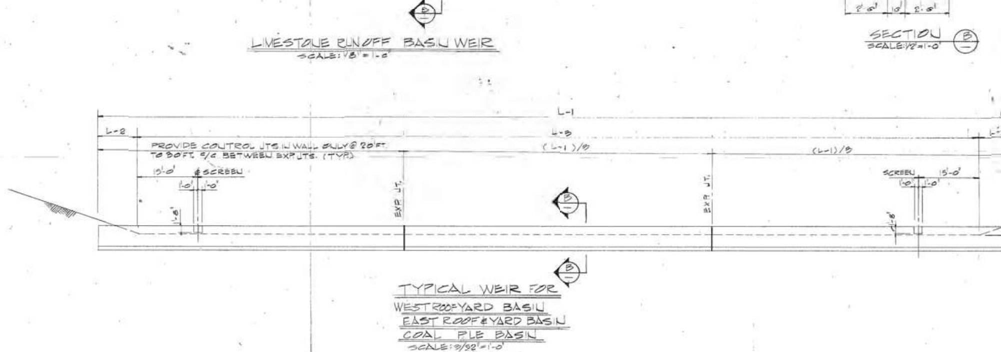

WEIR TABLE						
NAME OF BASIN	L-1	L-2	L-3	EL. 1	EL. 2	EL. 3
WEST YARD BASIN	268'	9'-0"	250'	449'	443'	447'
EAST YARD BASIN	198'	9'-0"	180	447'	441'	445'
COAL PILE BASIN	232'	13'-0"	206'	445'	439'	443'

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(SEAL)

WASTE WATER TREATMENT FACILITY SLUDGE WEIRS SECTIONS & DETAILS

STA. 3 POWERTON

MIDWEST GENERATION
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SCALE AS SHOWN
DATE 03-06-03

3B-0-2089

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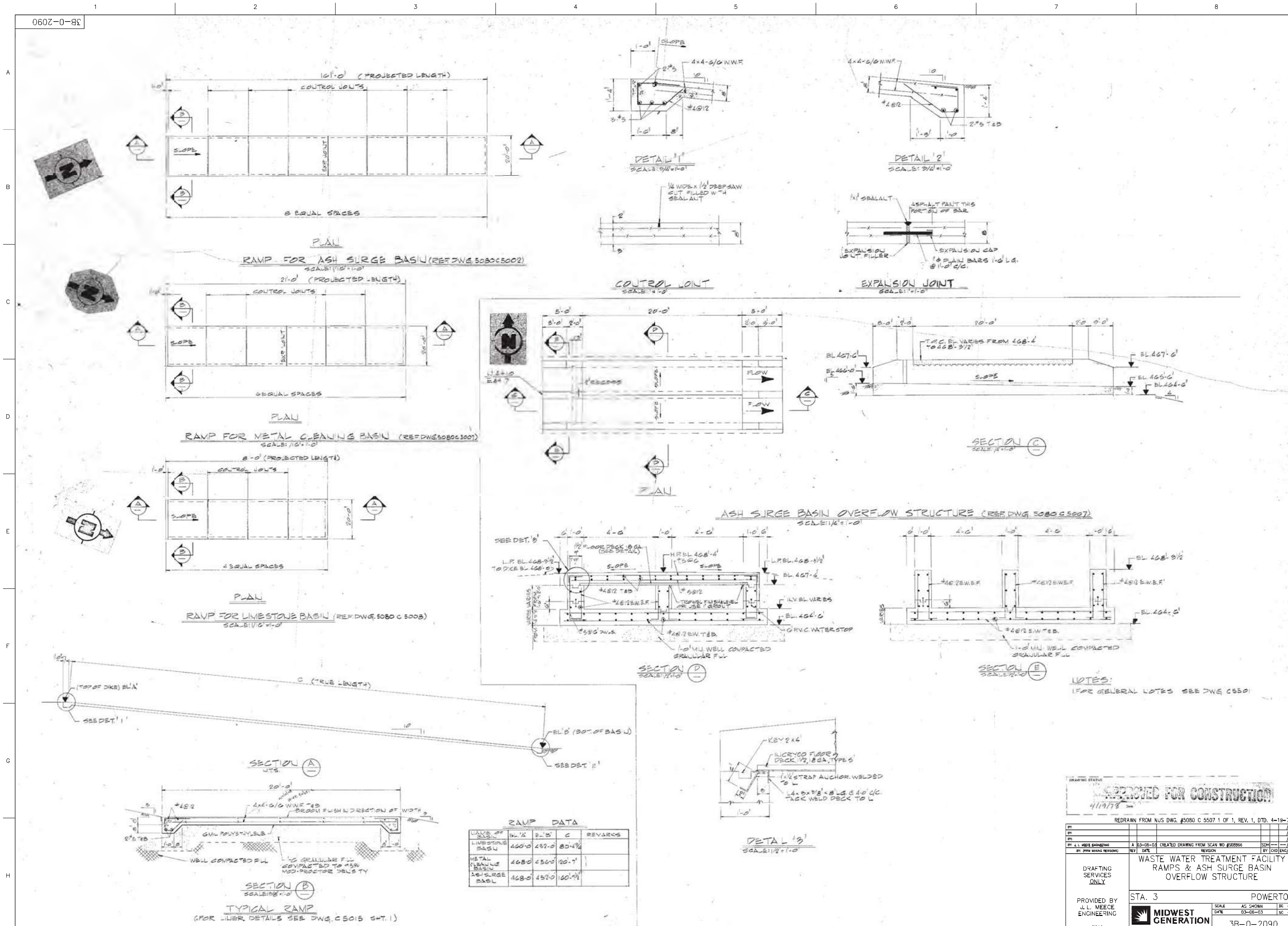

RAMP DATA

NAME OF BASIN	EL. 'A'	EL. 'B'	C	REMARKS
LIMESTONE BASIN	460'-0"	452'-0"	80'-4 3/4"	
METAL CLEANING BASIN	468'-0"	456'-0"	120'-7"	
ASH SURGE BASIN	468'-0"	452'-0"	160'-7 1/2"	

DRAWING STATUS
APPROVED FOR CONSTRUCTION
4/19/78 Date

REDRAWN FROM NUS DWG. #5080 C 5507 1 OF 1, REV. 1, DTD. 4-19-78

BY	REV	DATE	REVISION	BY	CKD	ENG/APPD
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BY:						/
BY:						/
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BY: (FIRM MAKING REVISIONS)	REV	DATE	REVISION	BY	CKD	ENG/APPD

DRAFTING SERVICES ONLY

PROVIDED BY J. L. MEECE ENGINEERING

(SEAL)

WASTE WATER TREATMENT FACILITY RAMPS & ASH SURGE BASIN OVERFLOW STRUCTURE

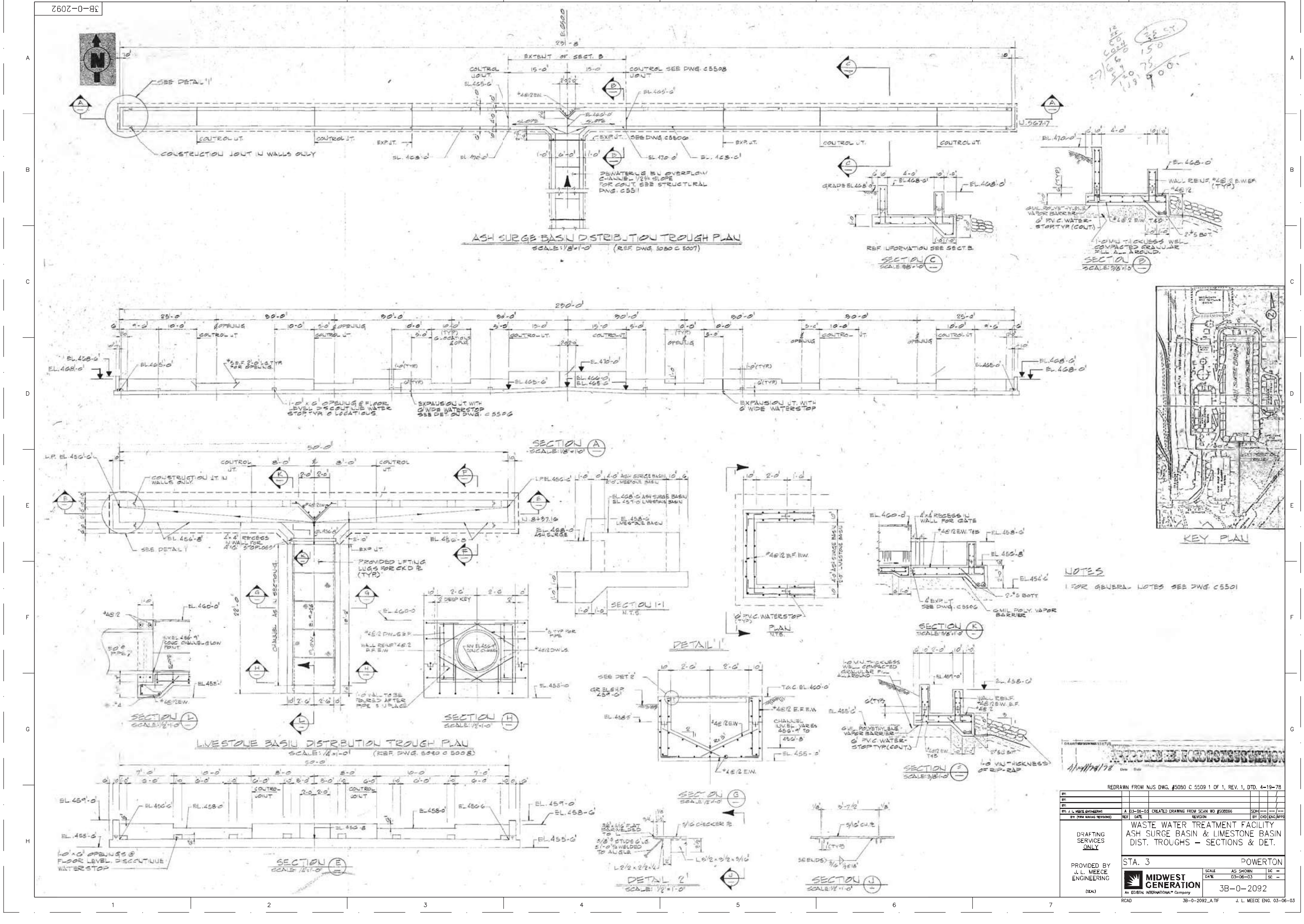
STA. 3 POWERTON

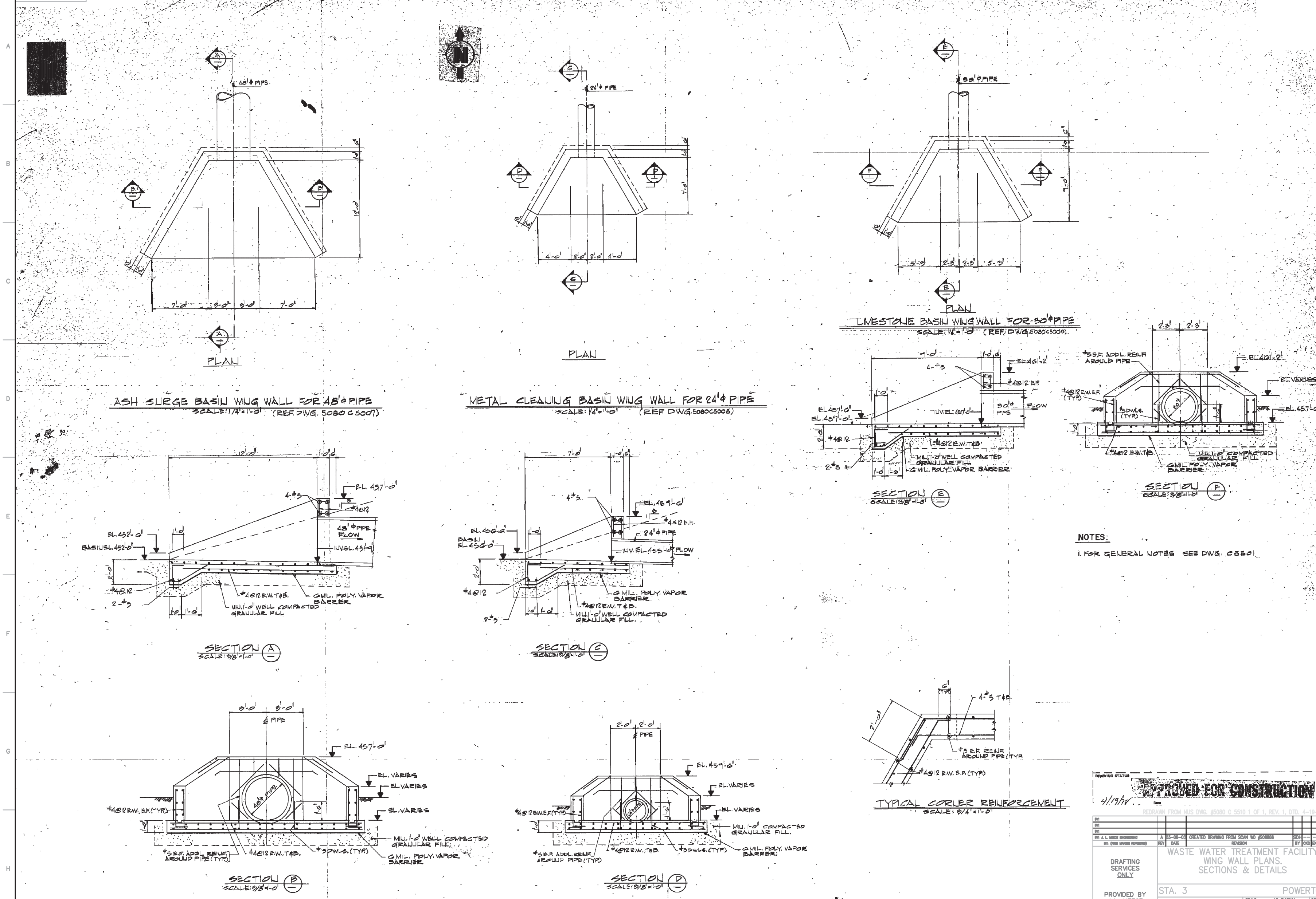
MIDWEST GENERATION
An EDISON INTERNATIONAL℠ Company

SCALE AS SHOWN | DC -
DATE 03-06-03 | SC -

3B-0-2090

RCAD 3B-0-2090_A.TIF J. L. MEECE ENG. 03-06-03


3B-0-2092
ASH SURGE BASIN DISTRIBUTION TROUGH PLAN
SCALE: 1/8"=1'-0" (REF. DWG. 5080 C 5007)
SECTION A
SCALE: 1/8"=1'-0"
SECTION C
SECTION D
KEY PLAN
NOTES
1. FOR GENERAL NOTES SEE DWG. C5501
LIMESTONE BASIN DISTRIBUTION TROUGH PLAN
SCALE: 1/4"=1'-0" (REF. DWG. 5080 C 5008)
SECTION 1-1
N.T.S.
DETAIL '1'
PLAN
N.T.S.
SECTION K
SECTION L
SECTION H
SECTION G
SECTION J
SECTION E
DETAIL '2'
REDRAWN FROM NJS DWG. #5080 C 5509 1 OF 1, REV. 1, DTD. 4-19-78
A 03-06-03 CREATED DRAWING FROM SCAN NO. #508886
REV DATE REVISION BY CKD ENG APPD
DRAFTING SERVICES ONLY
PROVIDED BY J. L. MEECE ENGINEERING
WASTE WATER TREATMENT FACILITY
ASH SURGE BASIN & LIMESTONE BASIN
DIST. TROUGHS – SECTIONS & DET.
STA. 3
POWERTON
MIDWEST GENERATION
An EDISON INTERNATIONAL Company
SCALE AS SHOWN
DATE 03-06-03
3B-0-2092
3B-0-2092_A.TIF
J. L. MEECE ENG. 03-06-03



NOTES:

1. FOR GENERAL NOTES SEE DWG. C5501

DRAWING STATUS
APPROVED FOR CONSTRUCTION
4/19/78 Date

REDRAWN FROM NUS DWG. #5080 C 5510 1 OF 1, REV. 1, DTD. 4-19-78

BY: (FIRM MAKING REVISIONS)	REV	DATE	REVISION	BY	CKD	ENG	APPD
BY:							
BY:							
BY:							
BY: J. L. MEECE ENGINEERING	A	03-06-03	CREATED DRAWING FROM SCAN WO #S08868	SDH	--	--	--

DRAFTING SERVICES ONLY

PROVIDED BY J. L. MEECE ENGINEERING

(SEAL)

WASTE WATER TREATMENT FACILITY
WING WALL PLANS.
SECTIONS & DETAILS

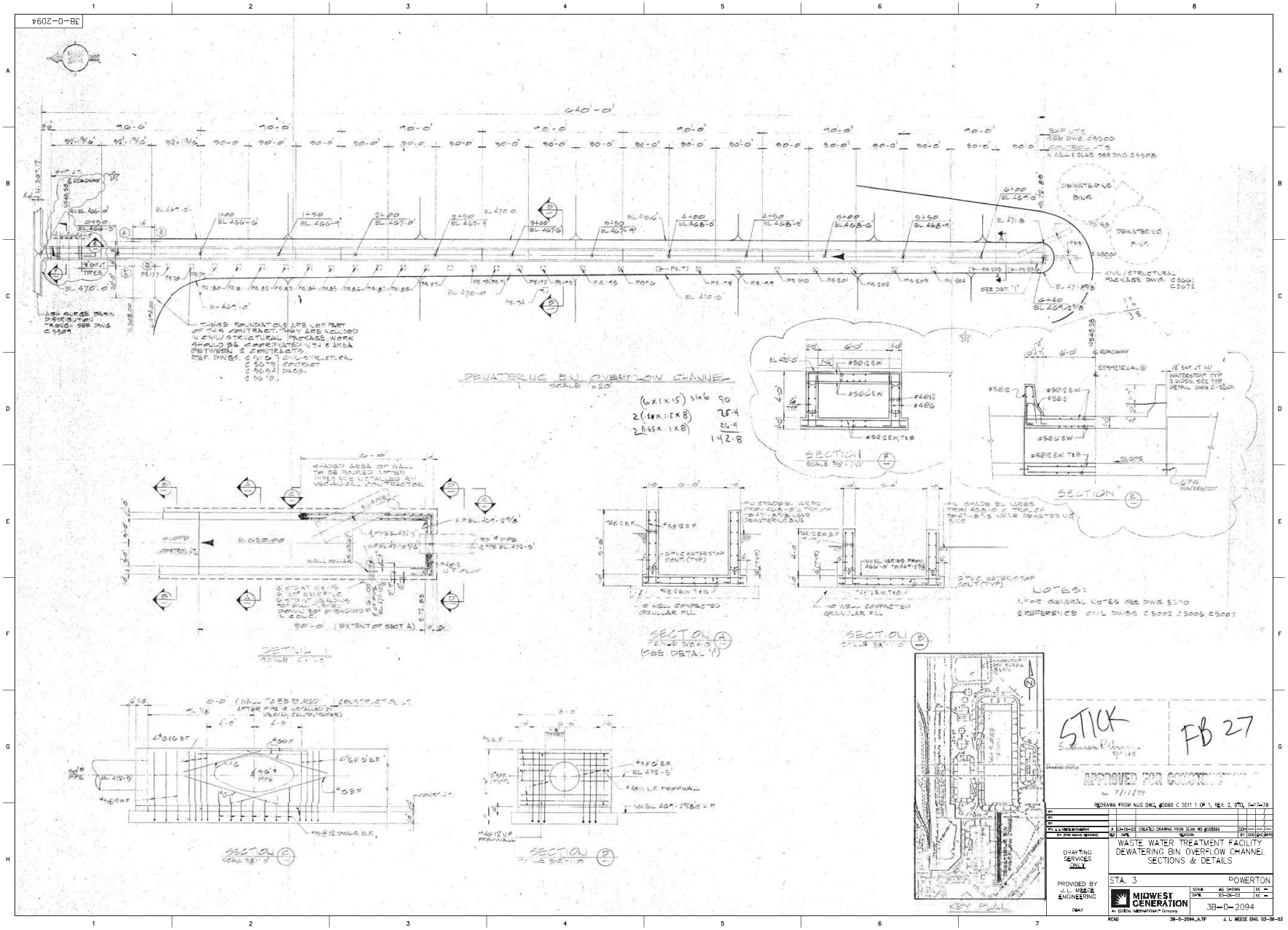
STA. 3 POWERTON

MIDWEST GENERATION
An EDISON INTERNATIONAL Company

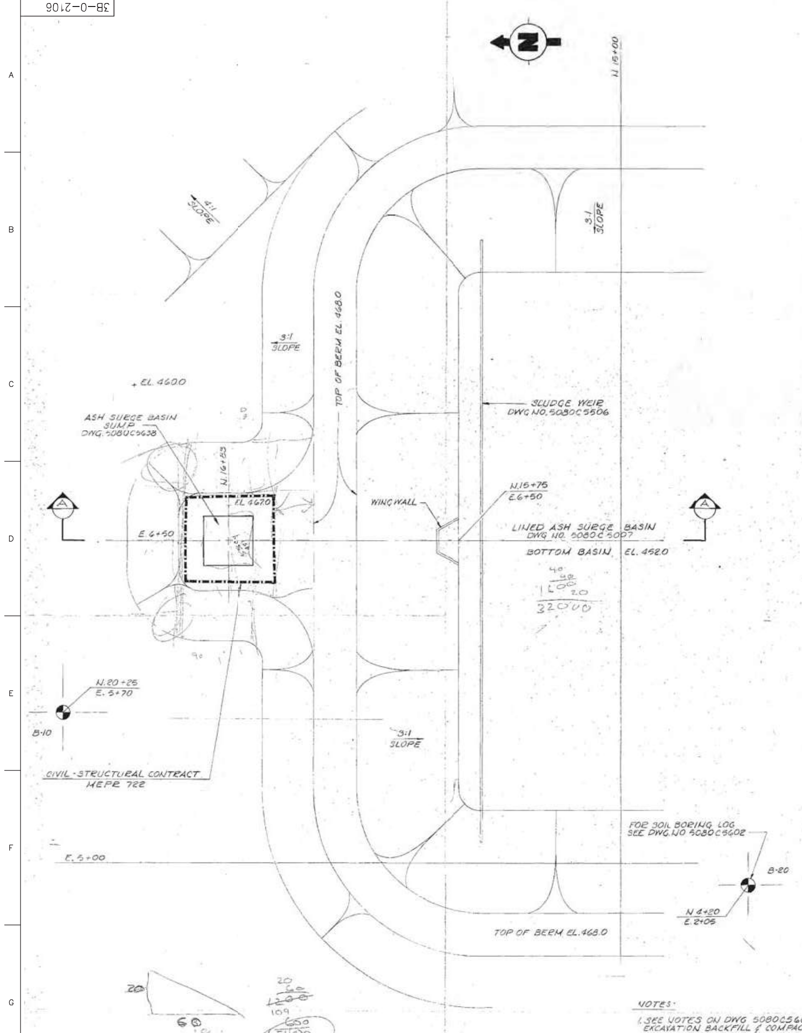
SCALE AS SHOWN DC –
DATE 03-06-03 SC –

3B-0-2093

RCAD 3B-0-2093_A.TIF J. L. MEECE ENG. 03-06-03


3B-0-2094
DEWATERING BIN OVERFLOW CHANNEL
SECTION
SECTION
SECTION
SECTION
SECTION
DETAIL
NOTES:
1. FOR GENERAL NOTES SEE DWG. 5370
2. REFERENCE CIVIL DWGS C5002, C5005, C5007
KEY PLAN
APPROVED FOR CONSTRUCTION
REDRAWN FROM NUS DWG. #50880 C 5511 1 OF 1, REV. 2, DTD. 7-17-78
WASTE WATER TREATMENT FACILITY
DEWATERING BIN OVERFLOW CHANNEL
SECTIONS & DETAILS
STA. 3
POWERTON
DRAFTING SERVICES ONLY
PROVIDED BY J. L. MEEDE ENGINEERING
MIDWEST GENERATION
An EDISON INTERNATIONAL Company
3B-0-2094
3B-0-2094_A.TIF
J. L. MEEDE ENG. 03-06-03

3B-0-2106



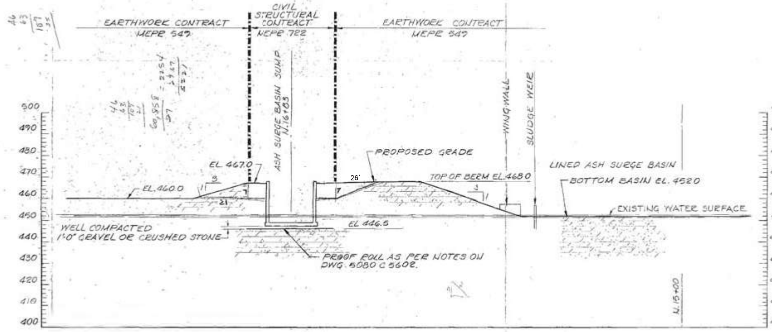
PLAN

SOIL BORING

B-10

ELEV	DESCRIPTION	DEPTH	SAMPLE	N	Qu	W	REMARKS
460.6	SURFACE						
	Brown, fine to coarse, silty SAND, some cinders, FILL		1 AU		-	9	
458.6	Very stiff brown silty CLAY some fine to coarse sand and gravel, FILL		2-SS	19	2 7	13	
455.6	Black fine to coarse SAND some gravel and cinders, FILL	5	3-ST			12	γd=126 pcf
			4-SS	34		8	
451.1	Very stiff gray silty CLAY, some cinders FILL	10	5-SS	17	2 0	14	
448.6	Black cinders (fine to coarse sand size), FILL		6-SS	16		16	
		15	7-SS	7		26	
440.1	Soft gray silty CLAY to CLAY	20	8-SS	5	0 7*	37	
437.1	Stiff to very stiff gray silty CLAY to CLAY trace fine to coarse sand and gravel	25	9 SS	6	1 0*	40	
		30	10-SS	12	3 2	16	LL=35 PI=21
426.6	Medium light brown, fine to coarse silty SAND and GRAVEL	35	11-SS	18	-	11	
424.6	End of Boring	40					

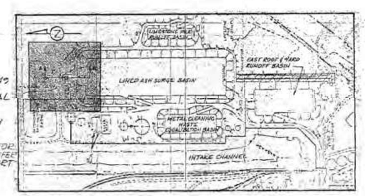
Penetrometer Value, TSF



SECTION (A)

NOTES:

1. SEE NOTES ON DWG 5080C5602 FOR EXCAVATION BACKFILL & COMPACTION PROCEDURES.
2. ASH SURGE BASIN & SLUDGE WEIR IS INCLUDED IN EARTHWORK CONTRACT MEPE549 WORK TO BE COORDINATED BETWEEN EARTHWORK CONTRACT & CIVIL-STRUCTURAL CONTRACT.
3. SOIL BORING DATA B-10 IS FURNISHED BY A&H ENGINEERING COMPANY, DOWNER'S GROVE, CHICAGO, ILL AS A PART OF THEIR SOIL INVESTIGATION WORK THIS DATA IS SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR. REFER SOIL INVESTIGATION REPORT FOR DETAIL REPORT



KEY PLAN

DRAWING STATUS

Date 6/13/78

REDRAWN FROM NUS DWG. #5080 C 5586 1 OF 1, REV. 1, DTD. 6-13-78

BY: (FIRM MAKING REVISIONS)	REV	DATE	REVISION	BY	CKD	ENG/APPD
BY:						/
BY:						/
BY:						/
BY: J. L. MEECE ENGINEERING	A	03-06-03	CREATED DRAWING FROM SCAN WO #508866	SDH	--	--/--

DRAFTING SERVICES ONLY

PROVIDED BY J. L. MEECE ENGINEERING

(SEAL)

WASTE WATER TREATMENT FACILITY
ASH SURGE BASIN
SUMP - SOIL PROFILE

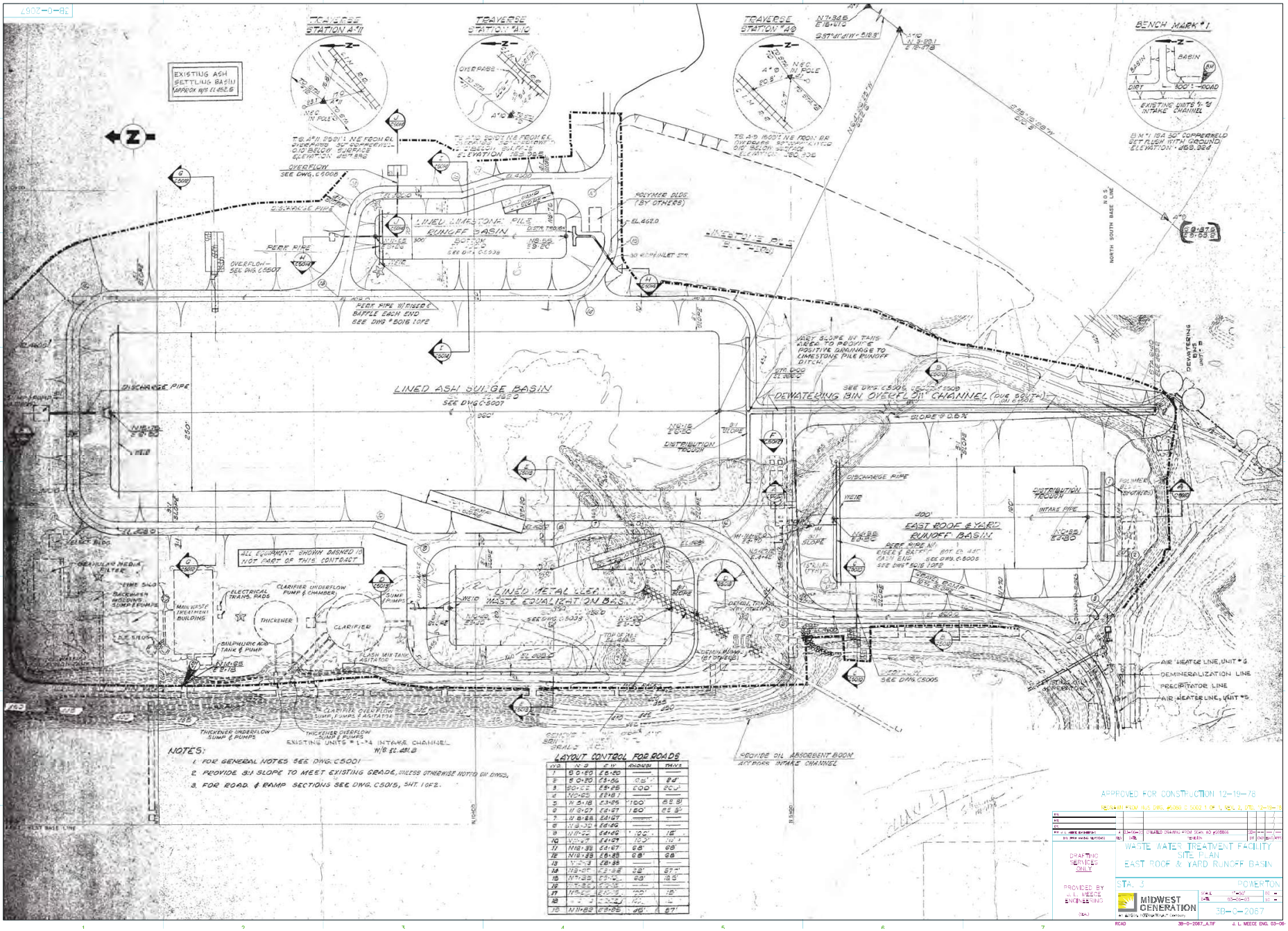
STA. 3 POWERTON

MIDWEST GENERATION
An EDISON INTERNATIONAL Company

SCALE 1"=20' DC -
DATE 03-06-03 SC -

3B-0-2106

RCAD 3B-0-2106_A.TIF J. L. MEECE ENG. 03-06-03


TRAVERSE STATION "A-11
TRAVERSE STATION "A10
TRAVERSE STATION "A9
BENCH MARK "1
EXISTING ASH SETTLING BASIN APPROX W/S EL 455.6
LINED LIMESTONE PILE RUNOFF BASIN
LINED ASH SLUICE BASIN
SEE DWG C-5007
DEWATERING BIN OVERFLOW CHANNEL (DUE EAST)
EAST ROOF & YARD RUNOFF BASIN
LINED METAL WASTE EQUALIZATION BASIN
POLYMER BLDG (BY OTHERS)
DISCHARGE PIPE
OVERFLOW SEE DWG. C5006
OVERFLOW SEE DWG. C5007
PERF. PIPE
DISTRIBUTION HOUSIN
INTAKE PIPE
ALL EQUIPMENT SHOWN DASHED IS NOT PART OF THIS CONTRACT
GRANULAR MEDIA FILTER
BACKWASH HOLDING SUMP & PUMPS
MAIN WASTE TREATMENT BUILDING
ELECTRICAL TRANS. PADS
CLARIFIER UNDERFLOW PUMP & CHAMBER
THICKENER
CLARIFIER
SUMP & PUMPS
SULPHURIC ACID TANK & PUMP
FLASH MIX TANK & AGITATOR
THICKENER UNDERFLOW SUMP & PUMPS
THICKENER OVERFLOW SUMP & PUMPS
CLARIFIER OVERFLOW SUMP, 1 PUMPS & AGITATOR
EXISTING UNITS # 1-4 INTAKE CHANNEL W/S EL. 451.8
PROVIDE OIL ABSORBENT BOOM AT PORT INTAKE CHANNEL
AIR HEATER LINE, UNIT # 6
DEMINERALIZATION LINE
PRECIPITATOR LINE
AIR HEATER LINE, UNIT # 5
NOTES:
1. FOR GENERAL NOTES SEE DWG. C5001
2. PROVIDE 3:1 SLOPE TO MEET EXISTING GRADE, UNLESS OTHERWISE NOTED ON DWGS.
3. FOR ROAD & RAMP SECTIONS SEE DWG. C5015, SHT. 1 OF 2.
LAYOUT CONTROL FOR ROADS
APPROVED FOR CONSTRUCTION 12-19-78
DRAFTING SERVICES ONLY
PROVIDED BY J. L. MEECE ENGINEERING
WASTE WATER TREATMENT FACILITY
SITE PLAN
EAST ROOF & YARD RUNOFF BASIN
STA. 3
POWERTON
MIDWEST GENERATION
3B-0-2067

APPENDIX A-2

Liner Replacement Drawings

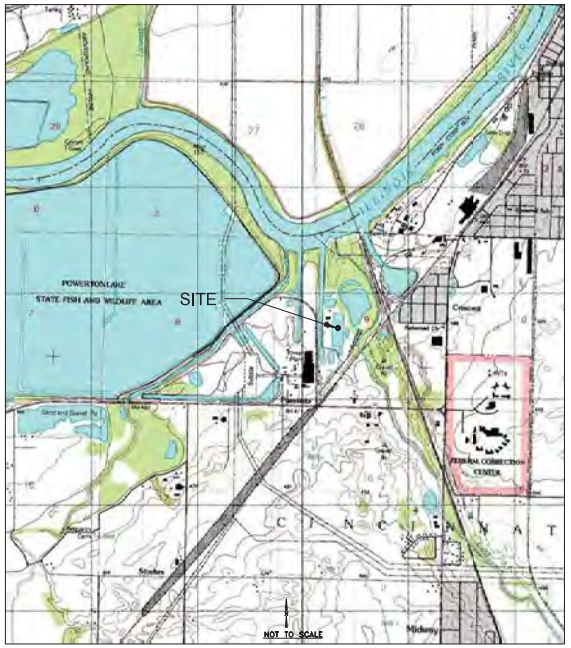
ASH SURGE BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON GENERATING STATION
PEKIN, ILLINOIS

LIST OF DRAWINGS

RECORD DRAWING LEGEND

~~PROPOSED~~	CROSSED OUT TEXT INDICATES CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION
PRE-CONSTRUCTION	UNDERLINED TEXT INDICATES ADDED NOTES OR COMMENTS, AND DOCUMENTS CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION
	"CLOUDS" DOCUMENT ADDITIONS AND/OR CHANGES FROM THE FINAL DESIGN TO RECORD CONSTRUCTION
	"CROSS OUTS" DOCUMENT OBJECTS REMOVED FROM THE FINAL DESIGN TO RECORD CONSTRUCTION

ILLINOIS



SITE LOCATION

PREPARED FOR:
MIDWEST GENERATION, LLC
13082 EAST MANITO RAOD
PEKIN, IL 61554

JULY 2014

REVISION	DATE	APP'D BY
0. ISSUED FOR PERMIT	01/15/13	HMS
1. ISSUED FOR BID	03/28/13	EJT
2. ISSUED FOR CONSTRUCTION	06/25/13	HMS
3. ISSUED FOR RECORD DOCUMENTATION	07/02/14	EJT
4.		
5.		
6.		

NATURAL RESOURCE TECHNOLOGY

TITLE SHEET
ASH SURGE BASIN LINER REPLACEMENT DOCUMENTATION
MIDWEST GENERATION
POWERTON GENERATING STATION
PEKIN, ILLINOIS

PROJECT NO. 2113.02POWERMID
DRAWN BY: RLH 01/14/13
CHECKED BY: HMS 01/14/13
APPROVED BY: HMS 01/15/13
DRAWING NO. D21132TS-03
REFERENCE: -
SHEET NO. TS

Jul 17, 2014 - 12:56pm PLOTTED BY: ddube SAVED BY: ddube
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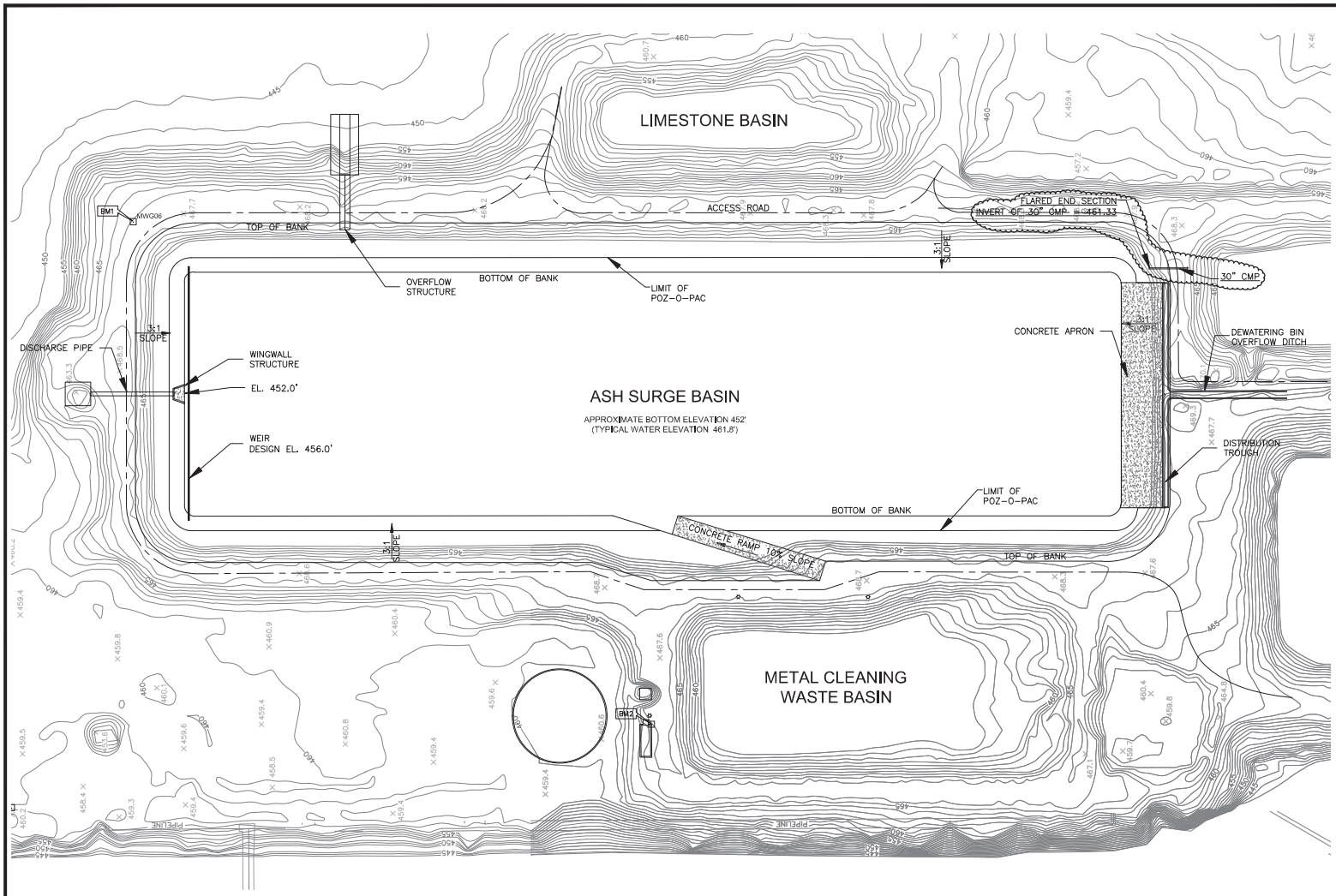

EXISTING GROUND SURFACE CONTOURS

LIMIT OF POZ-O-PAC

LIGHT POLE

ACCESS ROAD

CONCRETE

BENCHMARK LOCATION

NOTES:
1. SITE BENCHMARK 1 (MWG06) - BRONZE DISK ON STEEL ROD W/ ACCESS COVER IS AT ELEVATION 466.79 FEET (NGVD 29).
2. BENCHMARK 2 - SE CORNER TOP CONCRETE WALL, ELEVATION 468.09 FEET (NGVD 29).

CONTRACTOR NOTES: (COMPLETED DURING CONSTRUCTION)
1. ACCUMULATED ASH, SLUDGE/SEDIMENT, AND DEBRIS TO BE REMOVED BY CONTRACTOR, AS DIRECTED BY OWNER.

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD83 FEET.

VERTICAL DATUM:
PLANT DATUM

N

0 25 50 100
SCALE IN FEET

SOURCE NOTES:
1. TOPOGRAPHIC SURVEY BY AERO-METRIC, INC. DATED 6-19-2008, PROJECT NO. 1080611, PROVIDED BY MIDWEST GENERATION.
2. ASH SURGE BASIN FEATURES TAKEN FROM MIDWEST GENERATION DRAWING TITLED WASTE WATER TREATMENT FACILITY, DETAIL PLAN, ASH SURGE BASIN, NO. 3B-0-2071, DATED 5-12-78.
3. LOCATION OF 30" CMP PIPE FROM SURVEY BY RIDGELINE CONSULTANTS, PROJECT NUMBER 2013-0340, DATED SEPTEMBER 3, 2013, PROVIDED BY TERRA CONTRACTING SERVICES.

REVISION:	DATE:	APPD BY:
6.		
5.		
4.		
3. ISSUED FOR RECORD DOCUMENTATION	07/02/14	EJT
2. ISSUED FOR CONSTRUCTION	06/18/13	HMS
1. ISSUED FOR BID	03/28/13	EJT
0. ISSUED FOR PERMIT	01/15/13	HMS

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 2113.2
DRAWN BY: RLH 01/14/13
CHECKED BY: HMS 01/14/13
APPROVED BY: HMS 01/15/13

PRE-CONSTRUCTION SITE CONDITIONS

ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

DRAWING NO: D2113200010-03
REFERENCE: .

SHEET NO. C010

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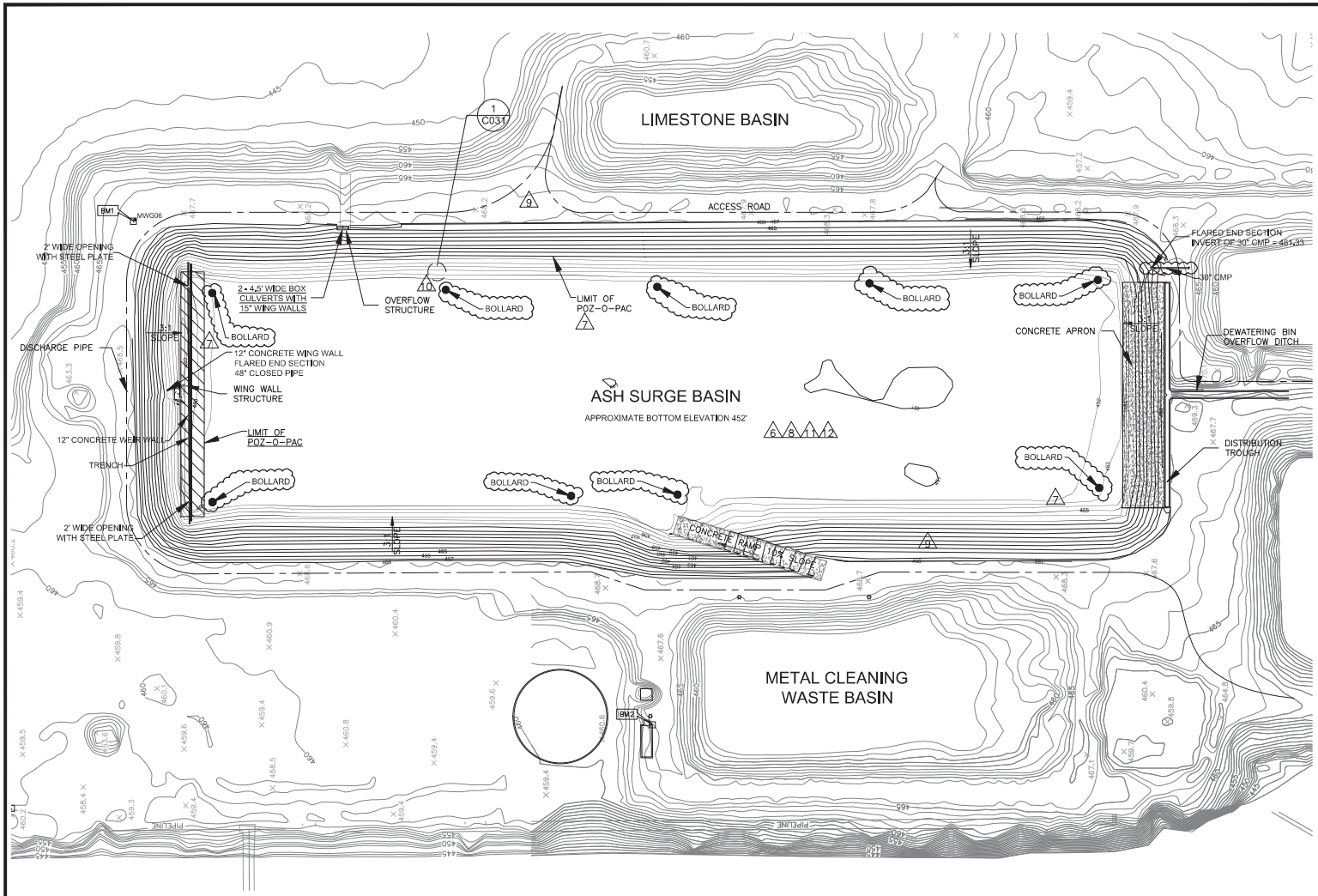
IMAGES:



EXISTING PREVIOUS GROUND SURFACE CONTOURS
SUBGRADE SURFACE CONTOUR
LIMIT OF POZ-O-PAC
LIGHT POLE
ACCESS ROAD
MARKER POST LOCATION
POZ-O-PAC REMOVAL AREA
CONCRETE
BENCHMARK LOCATION

NOTES:
1. SITE BENCHMARK 1 (MWG06) - BRONZE DISK ON STEEL ROD W/ ACCESS COVER IS AT ELEVATION 466.79 FEET (NGVD 29).
2. BENCHMARK 2 - SE CORNER TOP CONCRETE WALL, ELEVATION 488.09 FEET (NGVD 29).

CONTRACTOR NOTES: △ COMPLETED DURING CONSTRUCTION

1. CONTRACTOR SHALL FIELD VERIFY LOCATION OF UNDERGROUND PIPES WITH ASSISTANCE OF OWNER'S UTILITY LOCATOR.
2. CONTRACTOR SHALL FIELD VERIFY LOCATION OF CONCRETE APRON, CONCRETE STRUCTURES, AND ABOVE GROUND PIPING.
3. CLEAR AND GRUB ALL BRUSH ALONG TOP OF SLOPE OF BASIN.
4. CONTRACTOR SHALL STORE ALL GEOSYNTHETICS AND SUBGRADE MATERIALS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
5. CONTRACTOR SHALL STORE AND STAGE EQUIPMENT AT LOCATION APPROVED BY OWNER.
6. PROTECT ALL CONCRETE AND UTILITY STRUCTURES THROUGHOUT PROJECT DURATION.
7. ~~REMOVE EXISTING~~ 12-INCH POZ-O-PAC LAYER ALONG ~~SIDE SLOPES~~, POZ-O-PAC LAYER AT BASE OF BASIN TO REMAIN IN PLACE, EXCEPT NORTH OF WEIR AND 20 FOOT SECTION SOUTH OF WEIR, AS SHOWN. CONTRACTOR SHALL REMOVE AN ADDITIONAL 6 INCHES OF SUBGRADE MATERIAL LOCATED BETWEEN THE WEIR AND THE WING WALL STRUCTURE ALONG THE NORTH TOE OF SLOPE, AS SHOWN ON SHEET C032. REMOVE AT LEAST 18 INCHES OF POZ-O-PAC LAYER AND SUBGRADE MATERIAL AT BASE OF WEIR TO THE SOUTH AND GRADE AT A ~~1%~~ 7.5% SLOPE. REFER TO SHEET C032.
8. CONTRACTOR SHALL REMOVE ALL VEGETATION, ROCKS, AND OTHER DEBRIS FROM EXISTING LINER AND DISPOSE OF IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
9. CONTRACTOR SHALL RESHAPE SIDE SLOPES AS NECESSARY TO MAINTAIN 3:1 SIDE SLOPES, AND REMOVE "SOFT" SUBGRADE MATERIAL AS DIRECTED BY OWNER AND/OR ENGINEER. BACKFILL AREAS WITH FILL IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS. EXISTING HYPALON GEOMEMBRANE MAY REMAIN IN PLACE ALONG THE SIDE SLOPES, EXCEPT IN SOFT OR LOW/HIGH (RELATIVE TO GEOMEMBRANE SUBGRADE) AREAS, AS DIRECTED BY ENGINEER AND/OR OWNER.
10. CONTRACTOR SHALL INSTALL MARKER POSTS ALONG THE TOE OF SLOPE AS SHOWN AND IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND DETAIL 1 ON SHEET C031.
11. SUBGRADE MUST BE APPROVED BY OWNER AND/OR ENGINEER PRIOR TO INSTALLATION OF GEOMEMBRANE.
12. CONTRACTOR SHALL PROVIDE MEANS TO PROTECT SUBGRADE LAYER FROM EROSION, STORM WATER, AND HEAVY EQUIPMENT TRAFFIC. DAMAGE TO SUBGRADE LAYER SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD83 FEET.

VERTICAL DATUM:
PLANT DATUM

N

0 25 50 100
SCALE IN FEET

SOURCE NOTES:
1. TOPOGRAPHIC SURVEY BY AERO-METRIC, INC. DATED 6-19-2008, PROJECT NO. 1080611, PROVIDED BY MIDWEST GENERATION.
2. ASH SURGE BASIN FEATURES TAKEN FROM MIDWEST GENERATION DRAWING TITLED WASTE WATER TREATMENT FACILITY, DETAIL PLAN, ASH SURGE BASIN, NO. 3B-0-2071, DATED 5-12-78.
3. SUBGRADE CONTOURS AND FEATURE LOCATIONS FROM SURVEY BY RIDGELINE CONSULTANTS, PROJECT NUMBER 2013-0340, DATED SEPTEMBER 3, 2013, PROVIDED BY TERRA CONTRACTING SERVICES.

REVISION:	DATE:	APPD BY:
6.		
5.		
4.		
3. ISSUED FOR RECORD DOCUMENTATION	07/18/14	EJT
2. ISSUED FOR CONSTRUCTION	06/18/13	HMS
1. ISSUED FOR BID	03/28/13	EJT
0. ISSUED FOR PERMIT	01/15/13	HMS

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 2113.2
DRAWN BY: RLH 01/14/13
CHECKED BY: HMS 01/14/13
APPROVED BY: HMS 01/15/13

LINER SUBGRADE PREPARATION

ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

DRAWING NO: D2113200020-03
REFERENCE: .
SHEET NO. C020

Jul 18, 2014 - 12:27pm PLOTTED BY: ddodo SAVED BY: ddodo
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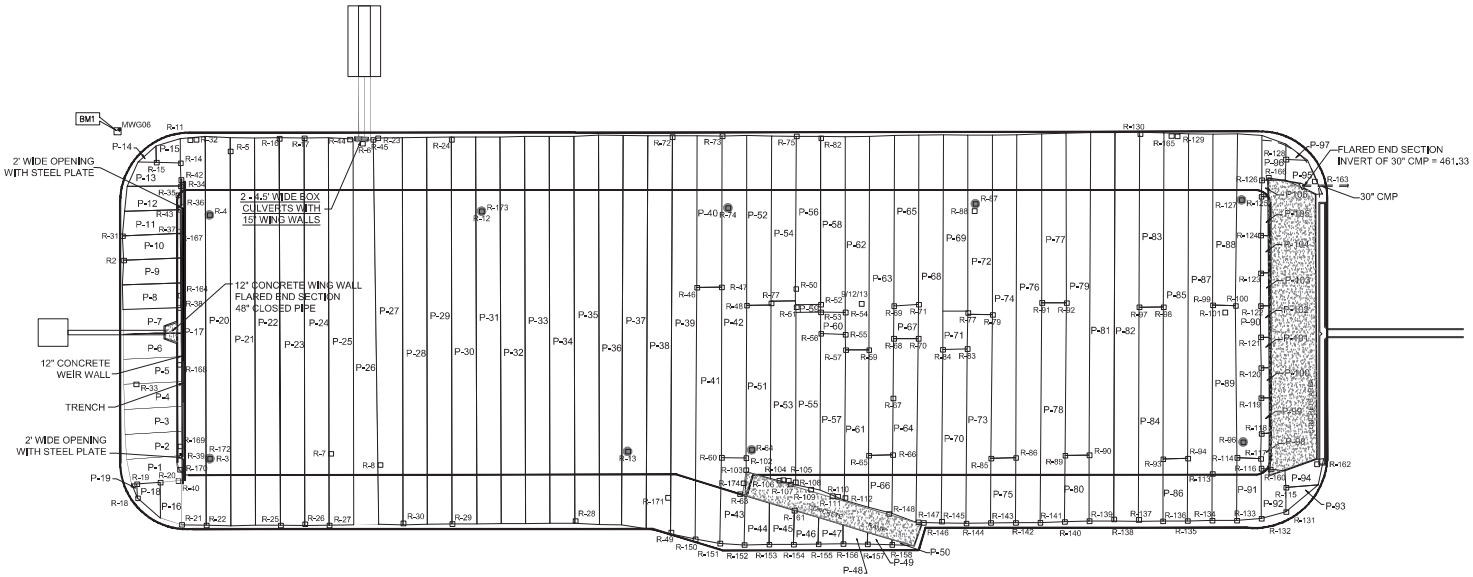
XREFS:
IMAGES:



GEOMEMBRANE PANEL SEAM

P23 GEOMEMBRANE PANEL AND PANEL NUMBER

R87 GEOMEMBRANE REPAIR LOCATION (NOT TO SCALE)

BM2 BENCHMARK LOCATION

MARKER POST LOCATION

NOTES:
1. SITE BENCHMARK 1 (MWG06) - BRONZE DISK ON STEEL ROD W/ ACCESS COVER IS AT ELEVATION 466.70 FEET (NGVD 29).
2. BENCHMARK 2 - SE CORNER TOP CONCRETE WALL, ELEVATION 468.09 FEET (NGVD 29).

N

0 25 50 100

SCALE IN FEET

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD83 FEET.

VERTICAL DATUM:
PLANT DATUM

SOURCE NOTES:

1. THIS DRAWING WAS DEVELOPED FROM SURVEY DATA BY RIDGELINE CONSULTANTS, PROJECT NUMBER 2013-0340, DATED SEPTEMBER 3, 2013, PROVIDED BY TERRA CONTRACTING SERVICES.

REVISION:	DATE:	APPD BY:
0. ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
1.		
2.		
3.		
4.		
5.		
6.		

NATURAL RESOURCE TECHNOLOGY

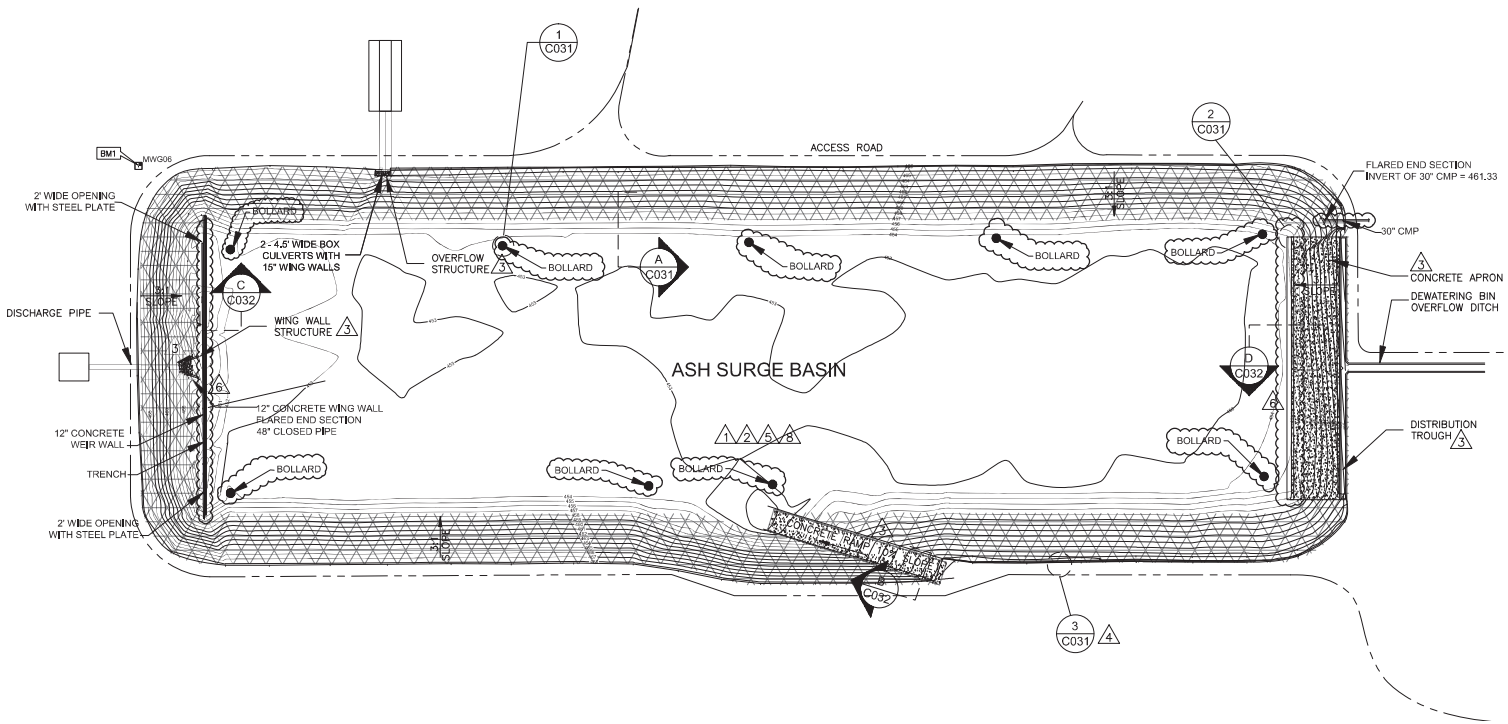
PROJECT NO.	2113.2
DRAWN BY:	RLH 03/06/14
CHECKED BY:	JRR 03/06/14
APPROVED BY:	EJT 07/17/14

GEOMEMBRANE PANEL LAYOUT

ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

DRAWING NO: D21132C021-00
REFERENCE: .

SHEET NO. C021



465 FINAL SURFACE CONTOUR

LIGHT POLE

ACCESS ROAD

MARKER POST LOCATION

HDPE GEOMEMBRANE

CONCRETE

~~RIPRAP~~

BM1 BENCHMARK

CONTRACTOR NOTES: △ COMPLETED DURING CONSTRUCTION

1. CONTRACTOR SHALL PLACE 16-OZ. NON-WOVEN GEOTEXTILE OVER THE SUBGRADE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS
2. CONTRACTOR SHALL INSTALL 60 MIL HDPE, WHITE, TEXTURED GEOMEMBRANE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION PRIOR TO PLACEMENT OF THE WARNING LAYER, CONTRACTOR SHALL PROVIDE AND FOLLOW AN APPROVED GEOMEMBRANE LAYOUT PLAN.
3. CONTRACTOR SHALL ATTACH GEOMEMBRANE TO STRUCTURES, CONCRETE RAMP, AND APRON, IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION AND DETAILS ON SHEET C031 AND C032.
4. GEOMEMBRANE SHALL BE ANCHORED INTO 2.5 FEET DEEP TRENCHES ALONG TOP OF BANK, AS SHOWN IN DETAIL 3 ON SHEET C031. CONTRACTOR SHALL ADVISE OWNER AND/OR ENGINEER IF PROPOSED LOCATION FOR ANCHOR TRENCH IS NOT FEASIBLE.
5. CONTRACTOR SHALL PLACE 16-OZ. NON-WOVEN GEOTEXTILE CUSHION MATERIAL AND WARNING LAYER MATERIAL OVER THE GEOMEMBRANE AT BASE AND 4 FEET ON SIDE SLOPES (SEE SECTION A SHEET C031), FOLLOWING ENGINEER APPROVAL AND PASSING QUALITY CONTROL RESULTS IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
6. CONTRACTOR SHALL PLACE AN 18-INCH LAYER OF ~~4 TO 12 INCH DIAMETER RIPRAP~~ WARNING LAYER MATERIAL BETWEEN WEIR AND WING WALL STRUCTURE ALONG THE NORTH TOE OF SLOPE AND AT TOE OF CONCRETE APRON AS DIRECTED BY ENGINEER. REFER TO DETAILS ON SHEET C032.
7. CONTRACTOR SHALL PROVIDE SURVEY DOCUMENTATION OF THE ITEMS LISTED IN THE TECHNICAL SPECIFICATIONS.
8. CONTRACTOR SHALL PERFORM A LEAK LOCATION SURVEY IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.
9. RESTORE AREAS DISTURBED BY EQUIPMENT AND MATERIAL LAYDOWN.

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD83 FEET.

VERTICAL DATUM:
PLANT DATUM

N

0 25 50 100
SCALE IN FEET

SOURCE NOTES:
1. TOPOGRAPHIC SURVEY BY AERO-METRIC, INC. DATED 6-19-2008, PROJECT NO. 1080611, PROVIDED BY MIDWEST GENERATION.
2. ASH SURGE BASIN FEATURES TAKEN FROM MIDWEST GENERATION DRAWING TITLED WASTE WATER TREATMENT FACILITY, DETAIL PLAN, ASH SURGE BASIN, NO. 3B-0-2071, DATED 5-12-78.
3. FINAL SURFACE CONTOURS AND FEATURE LOCATIONS FROM SURVEY BY RIDGELINE CONSULTANTS, PROJECT NUMBER 2013-0340, DATED OCTOBER 8, 2013, PROVIDED BY TERRA CONTRACTING SERVICES.

REVISION:	DATE:	APPD BY:
6.		
5.		
4.		
3. ISSUED FOR RECORD DOCUMENTATION	07/18/14	EJT
2. ISSUED FOR CONSTRUCTION	06/18/13	HMS
1. ISSUED FOR BID	03/28/13	EJT
0. ISSUED FOR PERMIT	01/15/13	HMS

NATURAL RESOURCE TECHNOLOGY

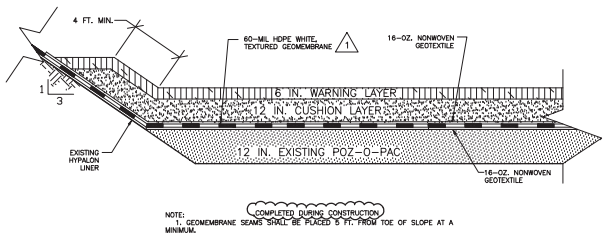
PROJECT NO. 2113.2/POWER/CON
DRAWN BY: RLH 01/15/13
CHECKED BY: HMS 01/15/13
APPROVED BY: HMS 01/16/13

WARNING LAYER PLAN

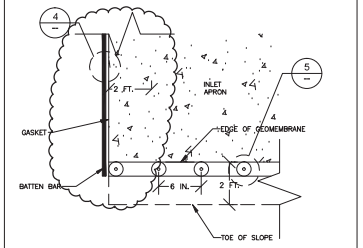
ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

DRAWING NO: D2113ZC030-03
REFERENCE: .

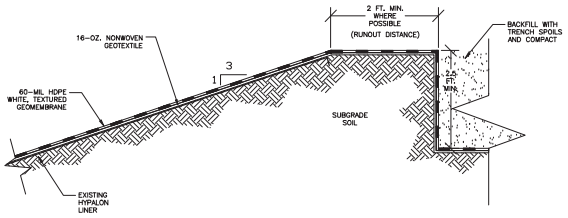
SHEET NO. C030



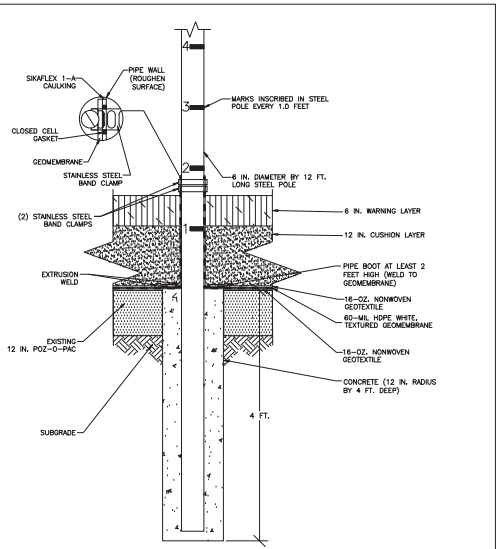
A / C030 SLOPE TRANSITION SECTION
NOT TO SCALE



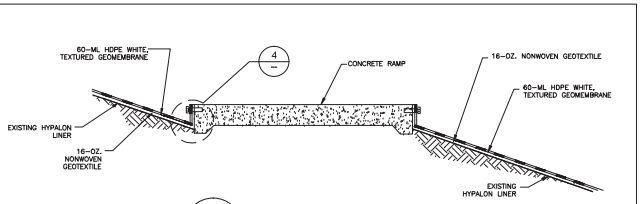
2 / C030 INLET APRON DETAIL PLAN
NOT TO SCALE



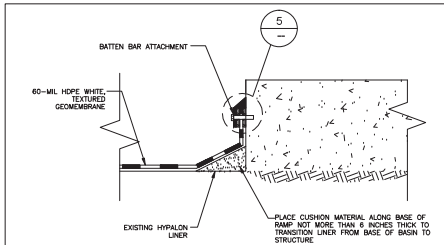
3 / C030 ANCHOR TRENCH DETAIL
NOT TO SCALE



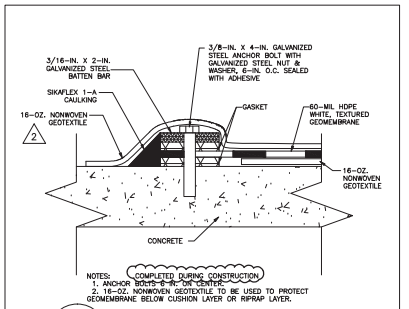
1 / C020 C030 MARKER POST DETAIL
NOT TO SCALE



B / C030 CONCRETE RAMP SECTION
NOT TO SCALE



4 / -- VERTICAL CONNECTION DETAIL
NOT TO SCALE



5 / --- BATTEN BAR ATTACHMENT
NOT TO SCALE

6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/25/13	HMS
1.	ISSUED FOR BID	03/28/13	EJT
0.	ISSUED FOR PERMIT	01/15/13	HMS
REVISION:		DATE:	APPD BY:

NATURAL RESOURCE TECHNOLOGY

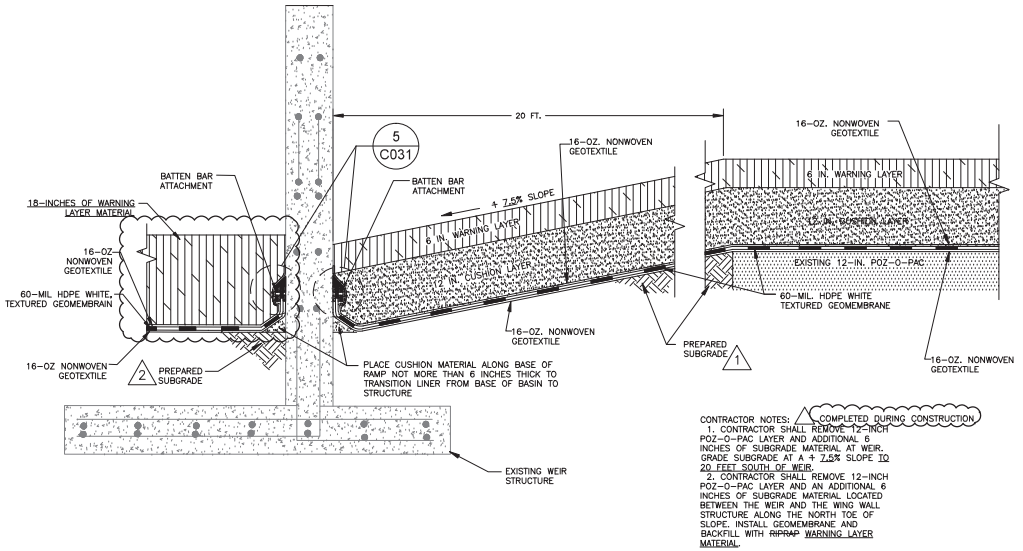
PROJECT NO.	2113.2/POWER/CON
DRAWN BY:	RLH 01/14/13
CHECKED BY:	HMS 01/14/13
APPROVED BY:	HMS 01/15/13

DETAILS AND SECTIONS

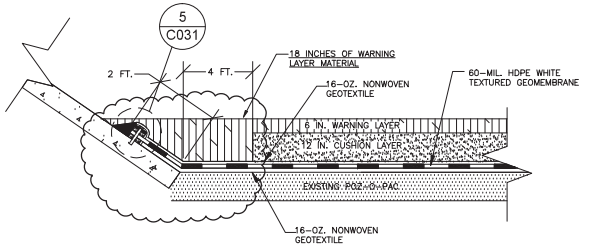
ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

DRAWING NO: D21132C031-03
REFERENCE: .

SHEET NO. C031



C / C030 CONCRETE WEIR SECTION
NOT TO SCALE



D / C030 INLET APRON SECTION
NOT TO SCALE

6.			
5.			
4.			
3.	ISSUED FOR RECORD DOCUMENTATION	07/17/14	EJT
2.	ISSUED FOR CONSTRUCTION	06/25/13	HMS
1.	ISSUED FOR BID	03/28/13	EJT
0.	ISSUED FOR PERMIT	01/15/13	HMS
REVISION:		DATE:	APPD BY:

NATURAL RESOURCE TECHNOLOGY

PROJECT NO.	2113.2/POWER/CON
DRAWN BY:	RLH 01/14/13
CHECKED BY:	HMS 01/14/13
APPROVED BY:	HMS 01/15/13

DETAILS AND SECTIONS

ASH SURGE BASIN LINER REPLACEMENT
POWERTON GENERATING STATION
MIDWEST GENERATION
PEKIN, ILLINOIS

DRAWING NO: D2113C032-04
REFERENCE: .

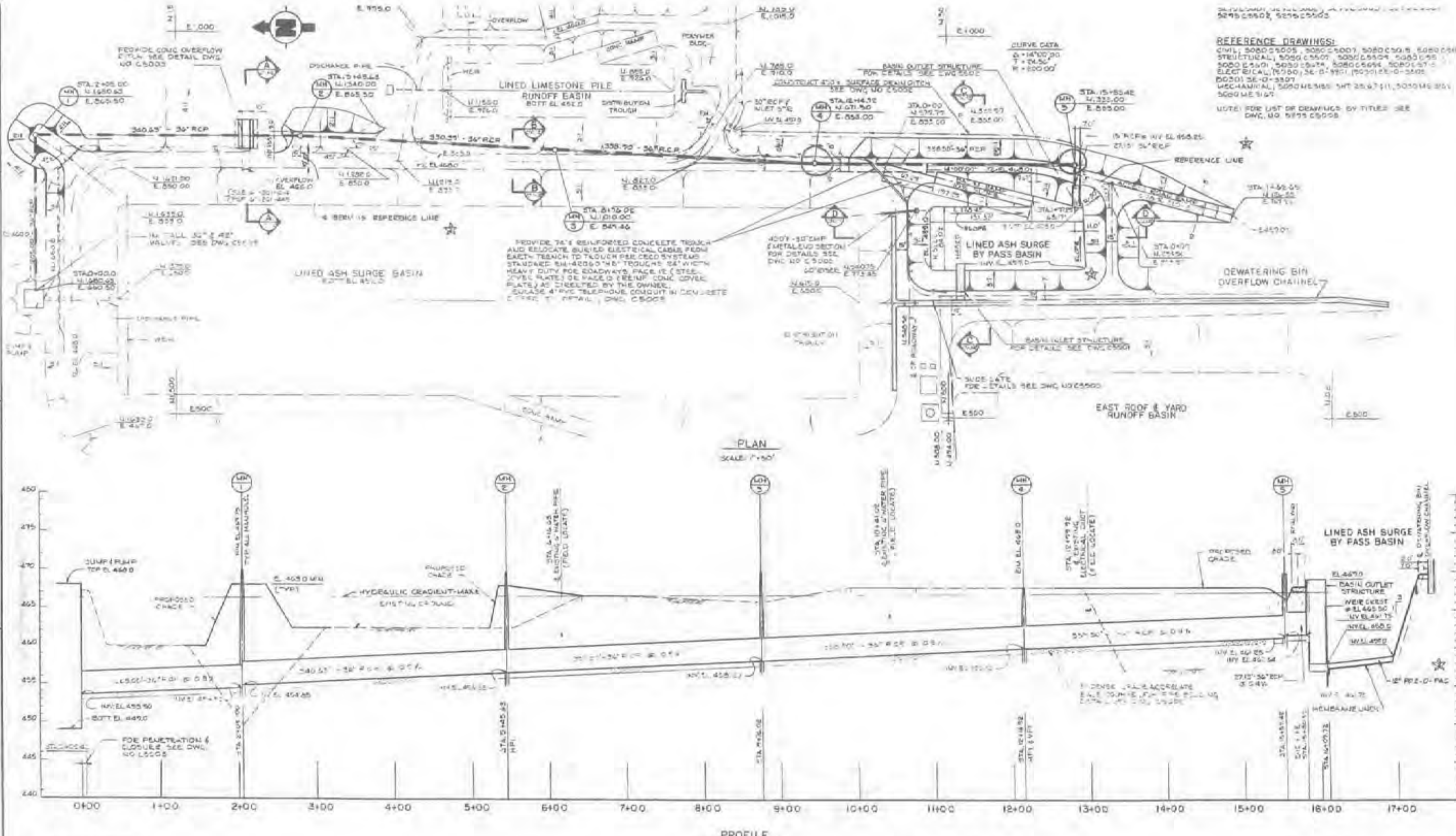
SHEET NO. C032

APPENDIX B

Ash Surge Basin Construction Drawings

APPENDIX B-1

NUS Construction Drawings



PLAN
SCALE: 1"=50'

PROFILE
SCALE: HOR. 1"=50' VERT. 1"=5'

MANHOLE SCHEDULE

MH NO	BY PASS STATION	EL TOP CONE	EL DWN PIPE INV. IN	EL DWN PIPE INV. OUT	MH DEPTH (MIN.)	NOTES
—	0+00	—	[illegible]	—	—	EXIST PUMP SUMP
1	2+05	465.0	454.85	454.55	14.45'	HPI 4.+50"
2	5+45.63	465.0	456.57	456.55	12.47'	HPI 4 +02'27"
3	8+76.02	465.0	458.28	458.18	10.82'	STRAIGHT RUN
4	12+14.92	467.25	459.98	459.84	7.57	HPI 4 [illegible] CHAL RINGS RED
5	15+55.42	465.0	461.64	461.65	7.75'	HPI 4 +50"
—	15+80.95	—	—	461.76	—	OUTLET STRUCTURE

NOTE: MAX HYDRAULIC GRADIENT EL 457.25±

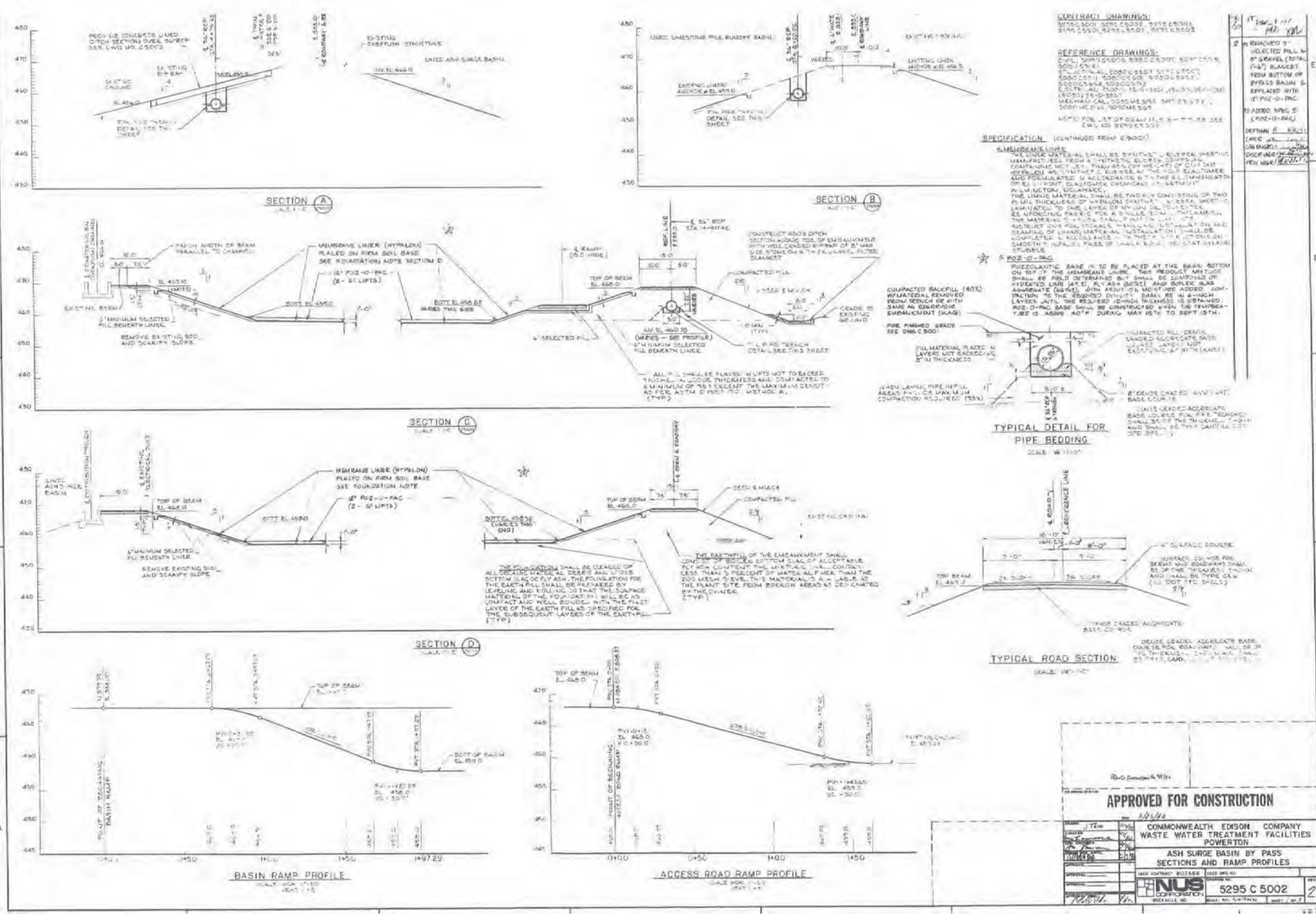
APPROVED FOR CONSTRUCTION
6/26/90

COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON

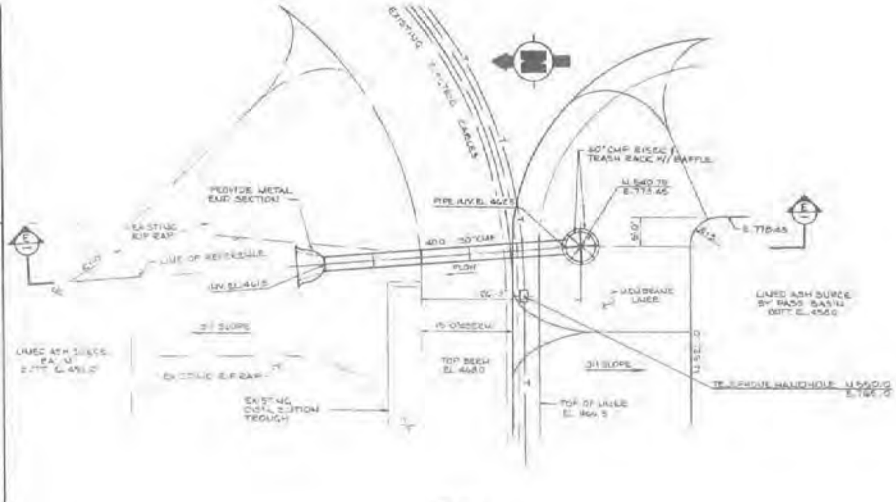
ASH SURGE BASIN BY PASS
PLAN AND PROFILE

NUS CORPORATION

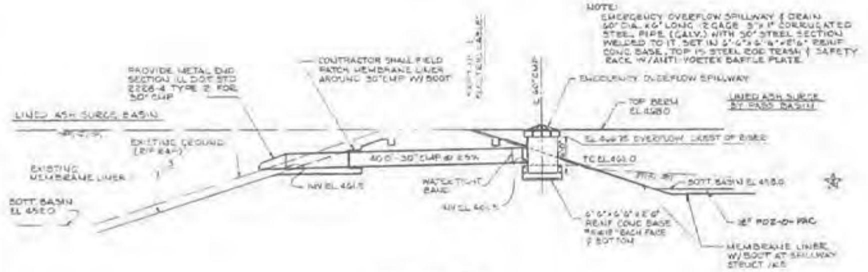
5295 C 5001 — REV. 2



SECTION A
SECTION B
SECTION C
SECTION D
TYPICAL DETAIL FOR PIPE BEDDING
TYPICAL ROAD SECTION
BASIN RAMP PROFILE
ACCESS ROAD RAMP PROFILE
CONTRACT DRAWINGS:
REFERENCE DRAWINGS:
SPECIFICATION (CONTINUED FROM C5001)
5. POZ-O-PAC
POZZOLANTIC BASE IS TO BE PLACED AT THE BASIN BOTTOM ON TOP OF THE MEMBRANE LINER. THIS PRODUCT MIXTURE SHALL BE FIELD DETERMINED BUT SHALL BE COMPOSED OF HYDRATED LIME (4%), FLY ASH (80%) AND BOILER SLAG AGGREGATE (16%), WITH ABOUT 15% MOISTURE ADDED. COMPACTION TO THE REQUIRED DENSITY SHALL BE IN 6-INCH LAYERS UNTIL THE REQUIRED 12-INCH THICKNESS IS OBTAINED. POZ-O-PAC BASE SHALL BE CONSTRUCTED WHEN THE TEMPERATURE IS ABOVE 40°F DURING MAY 15TH TO SEPT 15TH.
MEMBRANE LINER (HYPALON) PLACED ON FIRM SOIL BASE SEE FOUNDATION NOTE SECTION D
MEMBRANE LINER (HYPALON) PLACED ON FIRM SOIL BASE SEE FOUNDATION NOTE
12" POZ-O-PAC (2 - 6" LIFTS)
TOP OF BERM EL 468.0
SEED & MULCH
COMPACTED FILL
EXISTING GROUND
REMOVE EXISTING SOIL AND SCARIFY SLOPE
6" MINIMUM SELECTED FILL BENEATH LINER
APPROVED FOR CONSTRUCTION
COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON
ASH SURGE BASIN BY PASS
SECTIONS AND RAMP PROFILES
NUS CORPORATION
5295 C 5002
2



PLAN



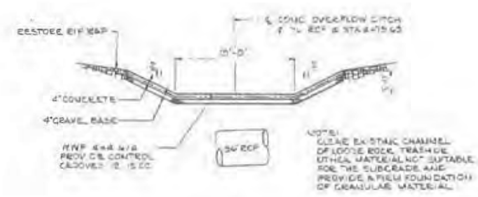
SECTION (E)

EMERGENCY OVERFLOW SPILLWAY

SCALE: 1/8"=1'-0"

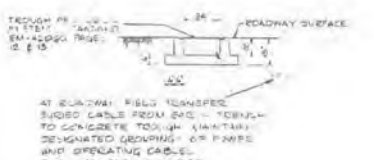
CONTRACT DRAWINGS		
DRAWING NO.	REV.	DRAWING TITLES
5295C5001	1	PLAN & PROFILE
5295C5002	1	DETAILS & SECTIONS
5295C5003	1	MISCELLANEOUS DETAILS
5295C5501	1	INLET STRUCTURE
5295C5502	1	OUTLET STRUCTURE
5295C5503	1	MISCELLANEOUS GATES
REFERENCE DRAWINGS		
5080C5006	2	DETAIL PLAN - EAST ROOF & YARD RUNOFF BASIN
5080C5007	2	DETAIL PLAN ASH SURGE BASIN
5080C5015	2	MISCELLANEOUS SECTIONS AND DETAILS, SHTS 1&2
5080C5121	1	BASIN END SECTION
5080C5507	1	RAMPS & ASH SURGE BASIN OVERFLOW STRUCTURE
5080C5509	1	ASH SURGE BASIN / LIMESTONE BASIN DISTRIBUTION TROUGH SECT. 14 & DETAILS
5080C5511	2	DEWATERING BIN OVERFLOW CHANNEL SECTIONS & DETAILS
5080C5601	2	STANDARD DETAILS
5080C5658	2	ASH SURGE BASIN SUMP - CLARIFIER OVERFLOW SUMP
5080C5654	1	PIPE SUPPORTS FRAMING PLAN & SECTIONS COL. 48 TO 51
5080C5712	1	ASH SURGE BASIN SUMP MAT FORM SECTIONS & DETAILS
(5080) 3E-0-3301	2	ELECTRICAL AREA LAYOUT EAST RUNOFF BASIN - NORTH
(5080) 3E-0-3306	3	ELECTRICAL AREA LAYOUT LIMESTONE PILE RUNOFF BASIN
(5080) 3E-0-3307	2	ELECTRICAL AREA LAYOUT ASH SURGE BASIN AREA
5080 ME 3153 SHT 2	4	PIPING ARRANGEMENT, YARD AREA
SHT 5	3	
SHT 6	3	
SHT 7	3	
SHT 11	3	
5080ME 3152 SHT 1	3	PIPING ARRANGEMENT YARD DETAIL EAST ROOF & YARD RUNOFF BASIN
5080ME 349 SHT 1	1	PIPING ARRANGEMENT YARD DETAIL LIMESTONE PILE RUNOFF BASIN AND ASH SURGE BASIN SUMPS

NOTE:
FOR ELECTRICAL CABLE TROUGH SEE CECO SYSTEMS STANDARD EH-42060 "HB" TROUGHS 24" WIDTH HEAVY DUTY FOR ROADWAYS PAGE 12 (STEEL COVER PLATE) OR PAGE 13 (REINFORCED CONCRETE LT/SL PLATE).



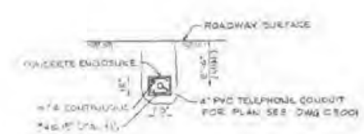
TYPICAL DETAIL
CONCRETE OVERFLOW DITCH

SCALE: 1/4"=1'-0"



DETAIL
ELECTRICAL CABLE TROUGH

SCALE: 3/4"=1'-0"



DETAIL
CONCRETE ENCLOSURE FOR TELEPHONE CONDUIT

SCALE: 3/8"=1'-0"

2 REMOVED COMPACTED SELECT AND GRANULAR BLANKET FROM BOTTOM OF BASIN AND ADDED 18" POZ-O-PAC, WRCE

CHANGED BOTTOM EL. 458.0 TO 459.0

APPROVED FOR CONSTRUCTION

6/24/83

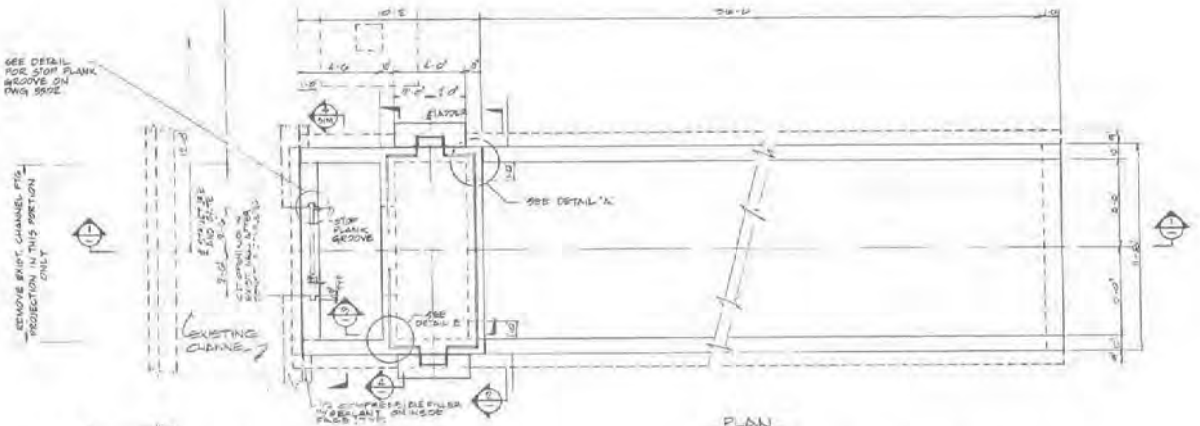
COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON

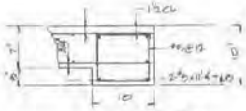
ASH SURGE BASIN BY PASS
MISCELLANEOUS DETAILS

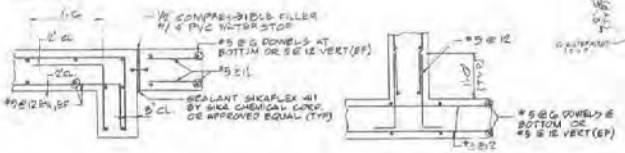
NUS CORPORATION

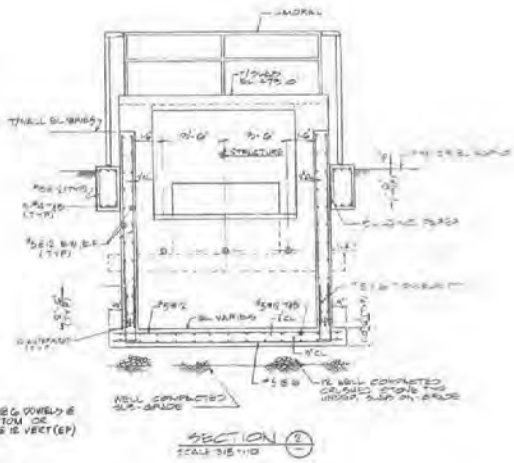
5295 C 5003

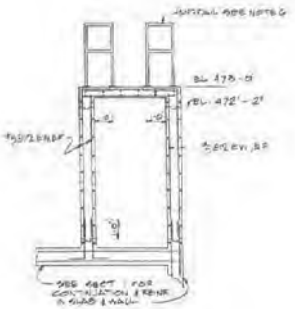
REV. 2

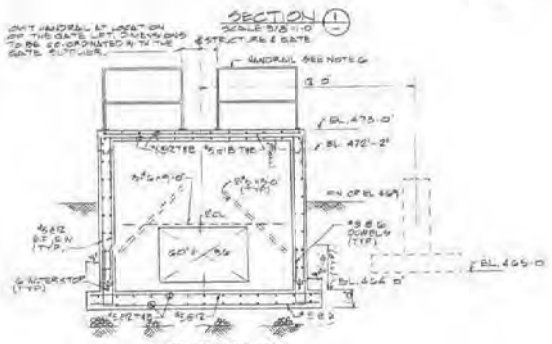












NOTES:

1. CONCRETE: f'c = 5000 PSI AT 28 DAYS
2. REINFORCING = ASTM A 615, GRADE 60
3. CONTRACTOR SHALL FURNISH AND INSTALL FRP STEEL GATE AND ACCESSORIES AS MANUFACTURED BY ARMCO STEEL CORP. CONFORMING TO THE FOLLOWING SPECS OR APPROVED EQUAL.
   a. GATE: MODEL 10-00
      QUANTITY REQUIRED = 1
      OPENING SIZE = 30"x30"
      FRAME TYPE = FLAT BACK STD BOTTOM
      MATERIAL COMBINATION = #2
      STEM DIA. = 1 1/2"Ø
   b. ACCESSORIES
      TYPE OF LIFT = CPS 2
      LIFT SUPPORT = WALL BRACKET TO MATCH CPS 2
      STEM SUPPORT = ADJUSTABLE STEM GUIDES AT SPACING RECOMMENDED BY MANUFACTURER
4. CONTRACTOR SHALL COORDINATE WITH THE GATE SUPPLIER FOR THE NUMBER, SIZE AND LOCATION OF ANCHOR BOLTS REQUIRED TO ATTACH THE GATE, WALL BRACKET AND STEM GUIDES TO THE SUPPORTING WALLS.
5. WORK THIS DWG. WITH CIVIL DWGS 5295 C 5001 & 5002.
6. FOR HANDRAIL & LADDER DETAILS SEE REF DWG 5080 C 5901
7. FOR STOP PLANKS SEE DWG 5295 C 5502 NOTE 4

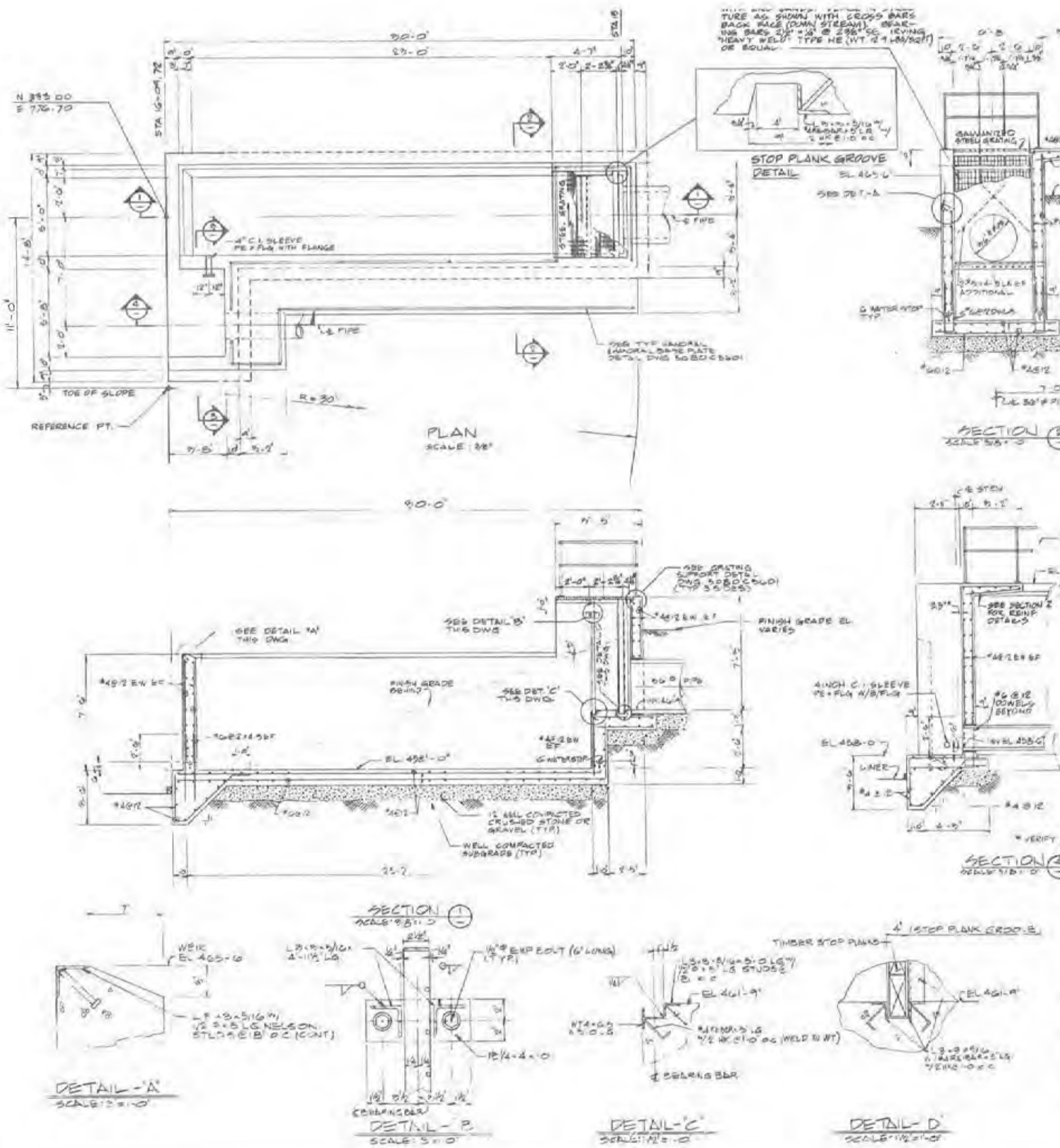
CONTRACT DRAWINGS:
5295 C 5001, 5002, 5003, 5501, 5502, 5503.

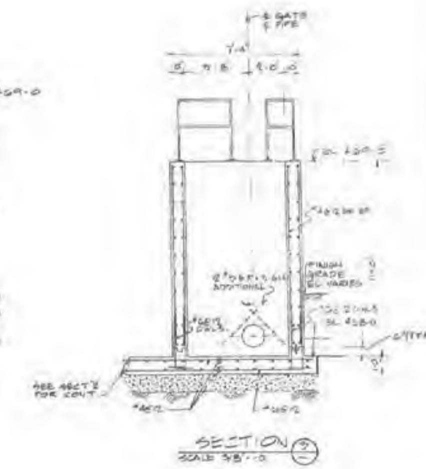
REFERENCE DRAWINGS:
CIVIL: 5080 C 5005, 5007, 5015, 5121
STRUCTURAL: 5080 C 5507, 5509, 551, 5601, 5638, 5654, 5715
ELECTRICAL: (5080) 3E-0-3301, 3305, 3307
MECHANICAL: 5080 ME 3155 SHT 2, 5, 6, 7 & 11, 3156, 3159

NOTE: FOR LIST OF DRAWINGS BY TITLES SEE DWG NO. 5295 C 5004

APPROVED FOR CONSTRUCTION
8/6/80

COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON
ASH SURGE BASIN BY PASS
BASIN INLET STRUCTURE
NUS CORPORATION ROCKVILLE, MD
5295 C 5501





NOTES:

1. SEE NOTE NO 1, 2, 4, 5 AND 6 ON DWG 5501.
2. CONTRACTOR SHALL FURNISH & INSTALL MEDIUM DUTY SLUICE GATE & ACCESSORIES AS MANUFACTURED BY ARMCO STEEL CORP. OR APPROVED EQUAL, CONFORMING TO FOLLOWING SPECS:
   a. GATE
      MODEL 20-10C
      QUANTITY REQD = 1
      OPENING SIZE = 15" DIA.
      FRAME TYPE = FLAT BACK
      MATERIAL COMBINATION = #2
      STEM DIA = 7/8"
   b. ACCESSORIES
      TYPE OF LIFT = H1-10
      FRAME HT = 12'-4 1/2" MINIMUM
3. STEEL GRATING TO BE IRVING WELDED RECTANGULAR DESIGN TYPE IHB-2 WITH 1 1/2" x 1/4" MAIN BARS, AS MANUFACTURED BY IKG INDUSTRIES OR APPROVED EQUAL (GALVANIZED)
4. STOP PLANKS TO BE DOUGLAS FIR COMMERCIAL GRADE NO 2 (WEST COAST)

   PROVIDE ONE SET OF 7 PLANKS 4" x 8" x 5'-5" LONG (DRESSED SIZE 3 1/2 x 7 1/2 x 5'-5")

   STOP PLANKS ARE INTERCHANGEABLE AT THREE LOCATIONS — SEE ALSO DWGS C5501 & C5503 (ONLY ONE SET REQUIRED UNLESS DIRECTED OTHERWISE BY OWNER)

CONTRACT DRAWINGS:
5295C 5001, 5002, 5003, 5501, 5502, 5503.

REFERENCE DRAWINGS:
CIVIL: 5080C 5005, 5007, 5013, 5121
STRUCTURAL: 5080C 5507, 5509, 5511, 5601, 5635, 5654, 5713.
ELECTRICAL: (Pwrn) 3E-0-3301, 3305, 3307
MECHANICAL: P-380 ME 9155 SHT 2, 5, 6, 7 & 11, 9162, 9169

NOTE: FOR LIST OF DRAWINGS BY TITLES SEE D. G. NO. 5295C 5003.

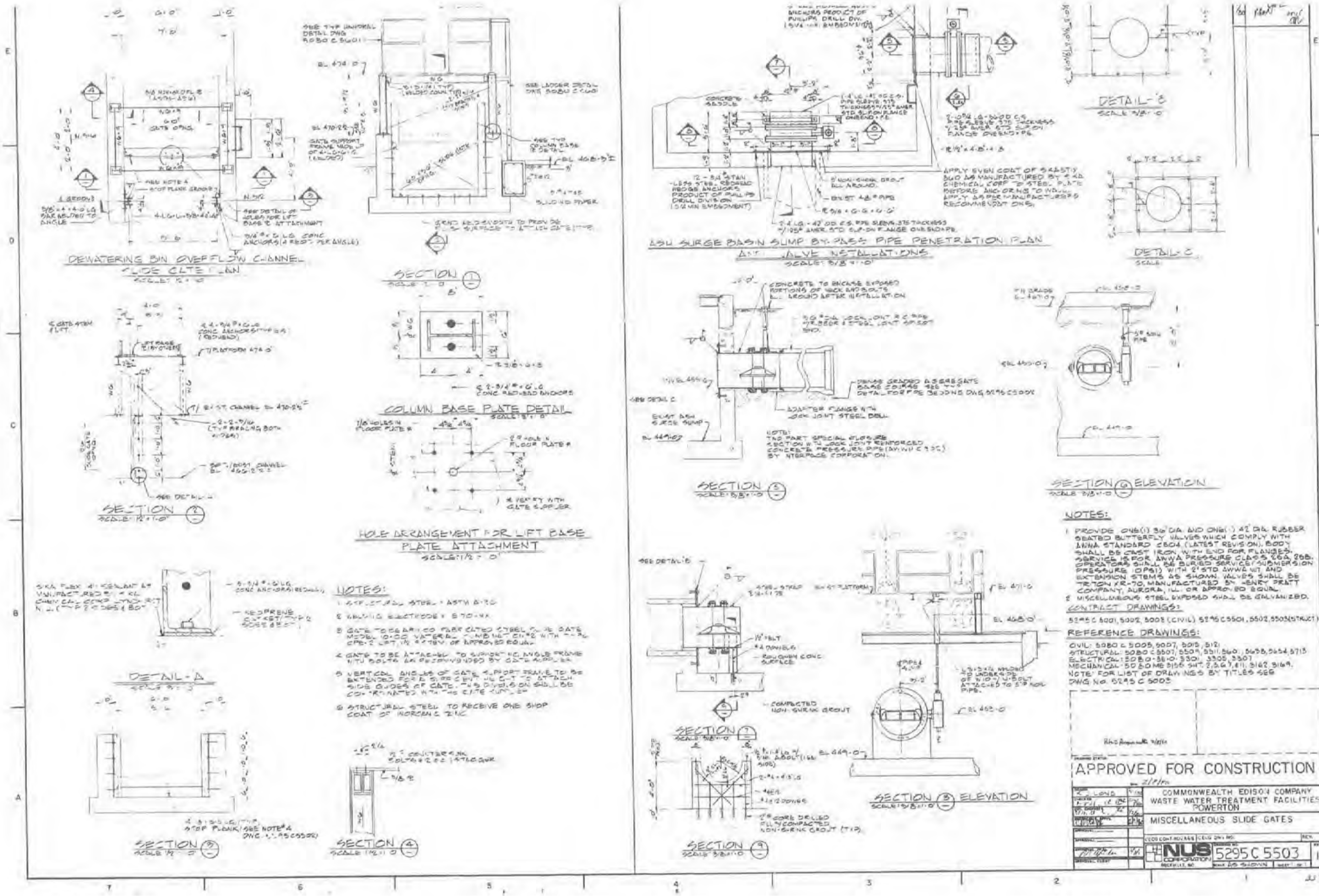
APPROVED FOR CONSTRUCTION
2/9/80

COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON

ASH SURGE BASIN BY PASS
BASIN OUTLET STRUCTURE

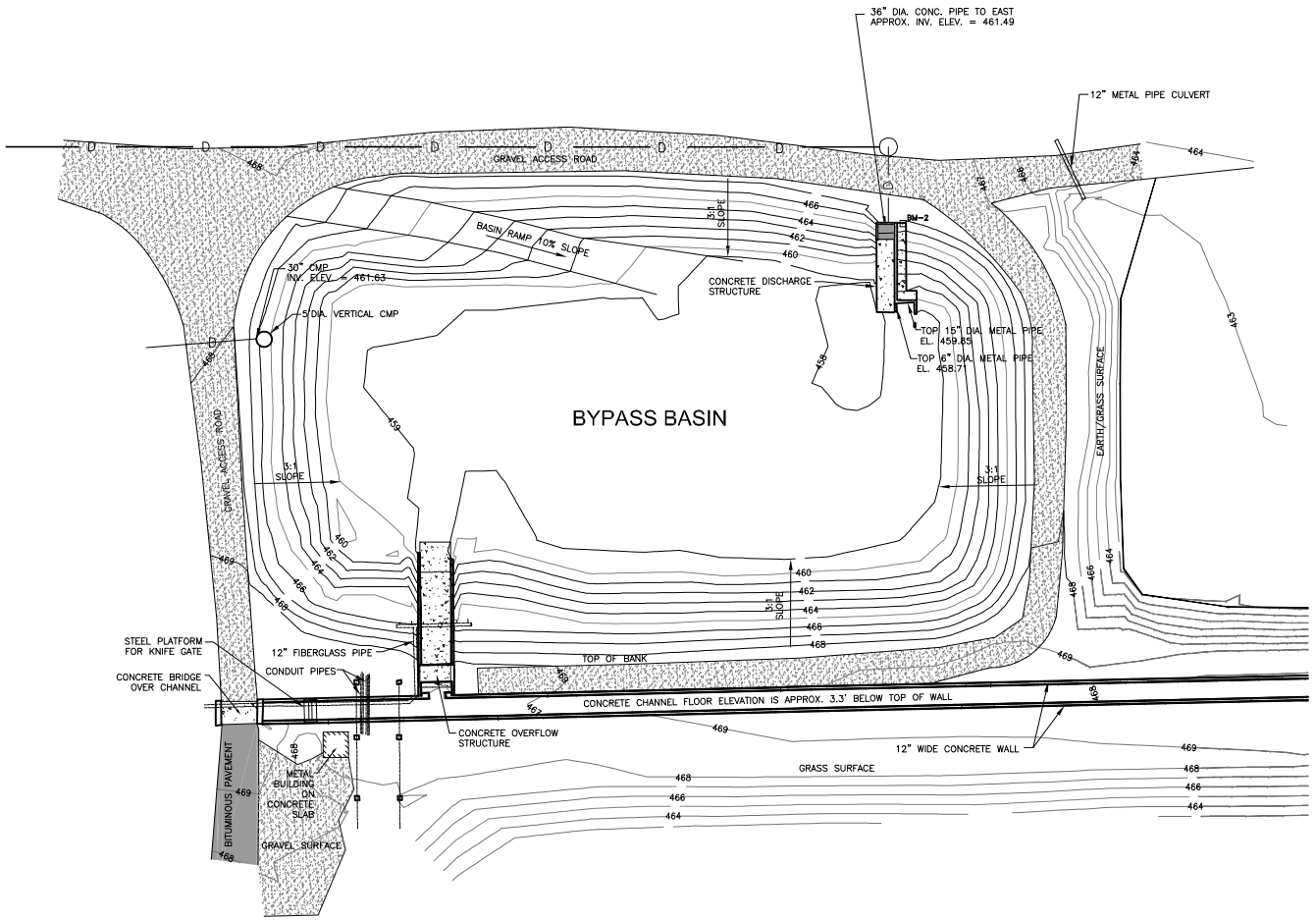
NUS CORPORATION
ROCKVILLE, MD.

5295C 5502


DEWATERING BIN OVERFLOW CHANNEL SLIDE GATE PLAN
SECTION 1
COLUMN BASE PLATE DETAIL
HOLE ARRANGEMENT FOR LIFT BASE PLATE ATTACHMENT
SECTION 2
DETAIL-A
SECTION 3
SECTION 4
ASH SURGE BASIN SUMP BY-PASS PIPE PENETRATION PLAN AND VALVE INSTALLATIONS
SECTION 5
DETAIL-B
DETAIL-C
SECTION 6 ELEVATION
SECTION 7
SECTION 8 ELEVATION
SECTION 9
NOTES:
1 PROVIDE ONE(1) 36" DIA. AND ONE(1) 42" DIA. RUBBER SEATED BUTTERFLY VALVES WHICH COMPLY WITH AWWA STANDARD C504 (LATEST REVISION). BODY SHALL BE CAST IRON WITH END FOR FLANGES. SERVICE IS FOR AWWA PRESSURE CLASS 150B. OPERATORS SHALL BE BURIED SERVICE/SUBMERSION PRESSURE (OPSI) WITH 2" STD AWWA NUT AND EXTENSION STEMS AS SHOWN. VALVES SHALL BE TRITON XR-70, MANUFACTURED BY HENRY PRATT COMPANY, AURORA, ILL. OR APPROVED EQUAL.
2 MISCELLANEOUS STEEL EXPOSED SHALL BE GALVANIZED.
CONTRACT DRAWINGS:
5295C 5001, 5002, 5003 (CIVIL) 5295C5501, 5502, 5503 (STRUCT)
REFERENCE DRAWINGS:
APPROVED FOR CONSTRUCTION
COMMONWEALTH EDISON COMPANY
WASTE WATER TREATMENT FACILITIES
POWERTON
MISCELLANEOUS SLIDE GATES
NUS CORPORATION
5295C 5503

APPENDIX B-2

Liner Replacement Construction Drawings



LEGEND

- D — UNDERGROUND DISCHARGE PIPE
- ABOVEGROUND INTAKE PIPE
- 460 — GROUND SURFACE CONTOUR
- BM-2 — BENCHMARK 2

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD83.

VERTICAL DATUM:
LOCAL PLANT DATUM

BENCHMARK 2:
NORTHEAST CORNER OF CONCRETE DISCHARGE STRUCTURE. CHISELED "+" IN CONCRETE ELEVATION 468.75 FT.

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A SURVEY MAURER STUTZ, INC. DATED SEPTEMBER 7, 2010, DRAWING NO. 23210023.
LOCATION OF BASIN AND ACCESS RAMP TAKEN FROM MIDWEST GENERATION DRAWING NO. 5295 C5001-2, DATED 6-26-1980.

N

0 10 20 40
SCALE IN FEET

	REVISION:	DATE:	APP'D BY:
6.			
5.			
4.			
3.			
2.	RECORD DOCUMENTATION	06/08/11	HMS
1.	ISSUED FOR BID	10/06/10	HMS
0.	ISSUED FOR PERMIT	06/30/10	HMS

NATURAL RESOURCE TECHNOLOGY

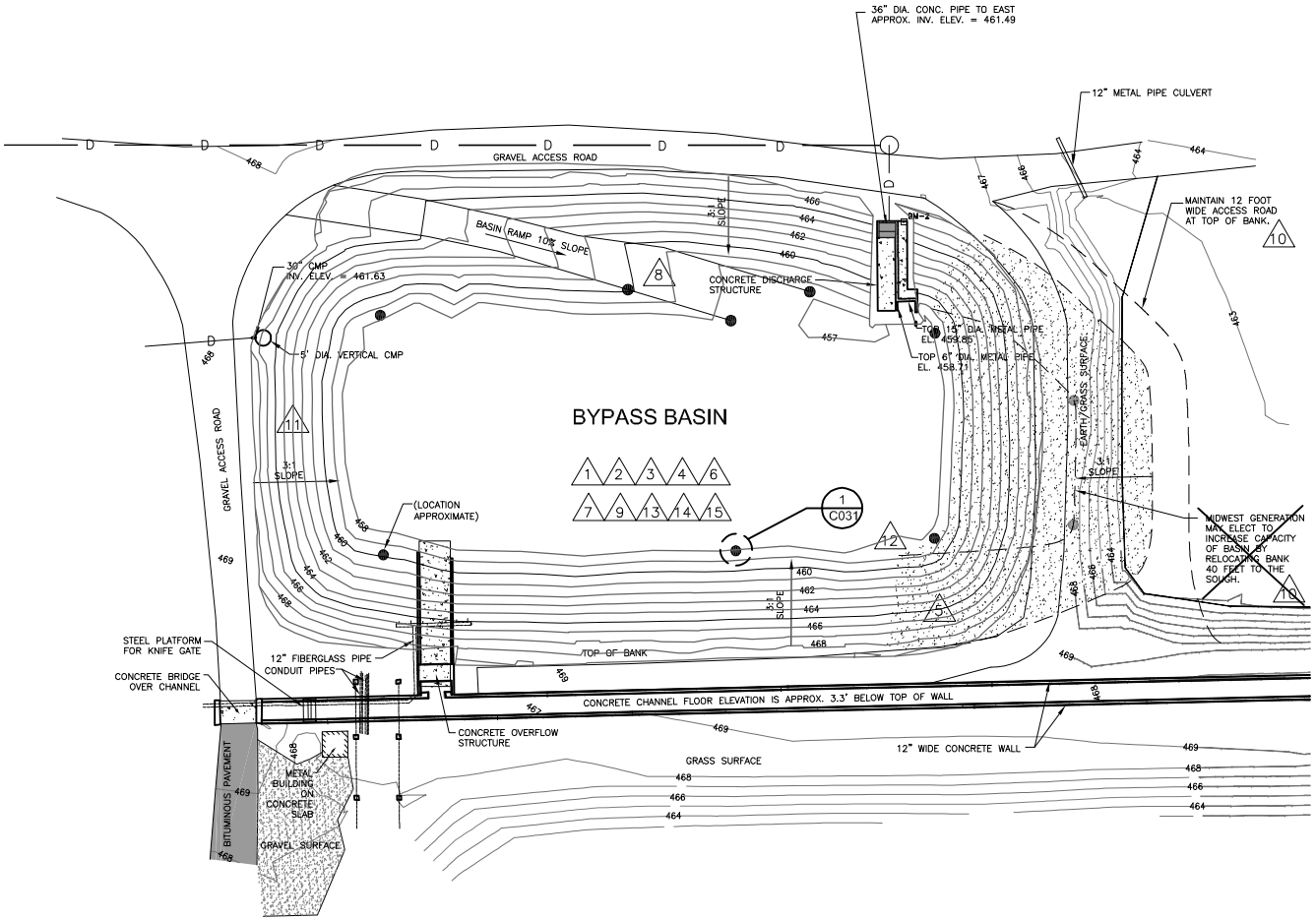
PROJECT NO. 1965.5/5.4
DRAWN BY: KNW 06/30/10
CHECKED BY: RJG 06/30/10
APPROVED BY: HMS 06/130/10

PRE-CONSTRUCTION CONDITIONS

BYPASS BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

DRAWING NO: D1965C010-02
REFERENCE: .

SHEET NO. C010



LEGEND

- UNDERGROUND DISCHARGE PIPE
- ABOVEGROUND INTAKE PIPE
- PREPARED SUBGRADE SURFACE CONTOUR
- 12 OZ. NON-WOVEN GEOTEXTILE
- MARKER POST LOCATION
- ADDITIONAL MARKER POST LOCATION IF BANK IS RELOCATED.
- BANK/AREA FOR POSSIBLE RELOCATION
- BM-2 BENCHMARK 2

CONTRACTOR NOTES:

1. CONTRACTOR SHALL FIELD VERIFY LOCATION OF UNDERGROUND PIPES WITH ASSISTANCE OF OWNER'S UTILITY LOCATOR.
2. CONTRACTOR SHALL FIELD VERIFY LOCATION OF CONCRETE STRUCTURES AND ABOVE GROUND PIPING.
3. CONTRACTOR SHALL STORE ALL GEOSYNTHETICS AND SUBGRADE MATERIALS IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
4. CONTRACTOR SHALL STORE AND STAGE EQUIPMENT AT LOCATION APPROVED BY OWNER.
5. CLEAR AND GRUB ALL BRUSH ALONG TOP OF SLOPE OF BASIN.
6. PROTECT ALL CONCRETE AND UTILITY STRUCTURES THROUGHOUT PROJECT DURATION.
7. CONTRACTOR SHALL REMOVE ALL VEGETATION, ROCKS, AND OTHER DEBRIS FROM EXISTING LINER AND DISPOSE OF IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
8. CONTRACTOR SHALL CLEAN OFF THE RAMP SURFACE TO THE EXTENT PRACTICAL TO REMOVE ROCKS THAT MAY POSE A HAZARD TO GEOMEMBRANE, AS APPROVED BY GEOMEMBRANE INSTALLER, ENGINEER AND/OR OWNER.
9. CONTRACTOR SHALL REMOVE 12-INCH LAYER OF POZ-O-PAC AND 6-INCHES OF POZ-O-PAC SUBGRADE FROM THE BASE OF BASIN.
~~10. CONTRACTOR SHALL RELOCATE SOUTHERN BANK 40 FEET TO THE SOUTH, AS DIRECTED BY OWNER. SEGREGATE GRAVEL ACCESS ROAD MATERIAL TO BE REUSED AS BASE SOURCE MATERIAL. MATERIAL REMOVED FROM THE EXISTING BANK MAY BE USED TO RECONSTRUCT NEW SOUTHERN BANK IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.~~
11. CONTRACTOR SHALL REMOVE "SOFT" SUBGRADE MATERIAL BENEATH EXISTING HYPALON LINER, AS DIRECTED BY OWNER AND/OR ENGINEER. BACK FILL AREAS WITH FILL IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS. CUT HYPALON AS NEEDED TO REPAIR THE "SOFT" SUBGRADE AREAS.
12. CONTRACTOR SHALL INSTALL MARKER POSTS ALONG THE TOE OF SLOPE AS SHOWN AND IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS AND DETAIL 1 ON SHEET C031.
13. CONTRACTOR SHALL PLACE 16 OZ. NONWOVEN GEOTEXTILE AT BASE OF BASIN AND WHERE HYPALON LINER DOES NOT EXIST OR WAS REMOVED OF THE PREPARED SUBGRADE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS.
14. SUBGRADE SHALL BE APPROVED BY OWNER AND/OR ENGINEER PRIOR TO INSTALLATION OF GEOMEMBRANE.
15. CONTRACTOR SHALL PROVIDE MEANS TO PROTECT SUBGRADE FROM EROSION, STORM WATER, AND HEAVY EQUIPMENT TRAFFIC. DAMAGE TO SUBGRADE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD83.

VERTICAL DATUM:
LOCAL PLANT DATUM

BENCHMARK 2:
NORTHEAST CORNER OF CONCRETE DISCHARGE STRUCTURE. CHISELED "+" IN CONCRETE ELEVATION 468.75 FT.

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A SURVEY MAURER STUTZ, INC. DATED SEPTEMBER 7, 2010, DRAWING NO. 23210023.
LOCATION OF BASIN AND ACCESS RAMP TAKEN FROM MIDWEST GENERATION DRAWING NO. 5295 C5001-2, DATED 6-26-1980.
BASIN SUBGRADE AND SITE IMPROVEMENTS FROM A SURVEY PROVIDED BY MILLENNIA PROFESSIONAL SERVICES, MARCH 2011.

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SCALE IN FEET

REVISION:		DATE:	APP'D BY:
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2.	RECORD DOCUMENTATION	06/08/11	HMS
1.	ISSUED FOR BID	10/06/10	HMS
0.	ISSUED FOR PERMIT	06/30/10	HMS

NATURAL RESOURCE TECHNOLOGY

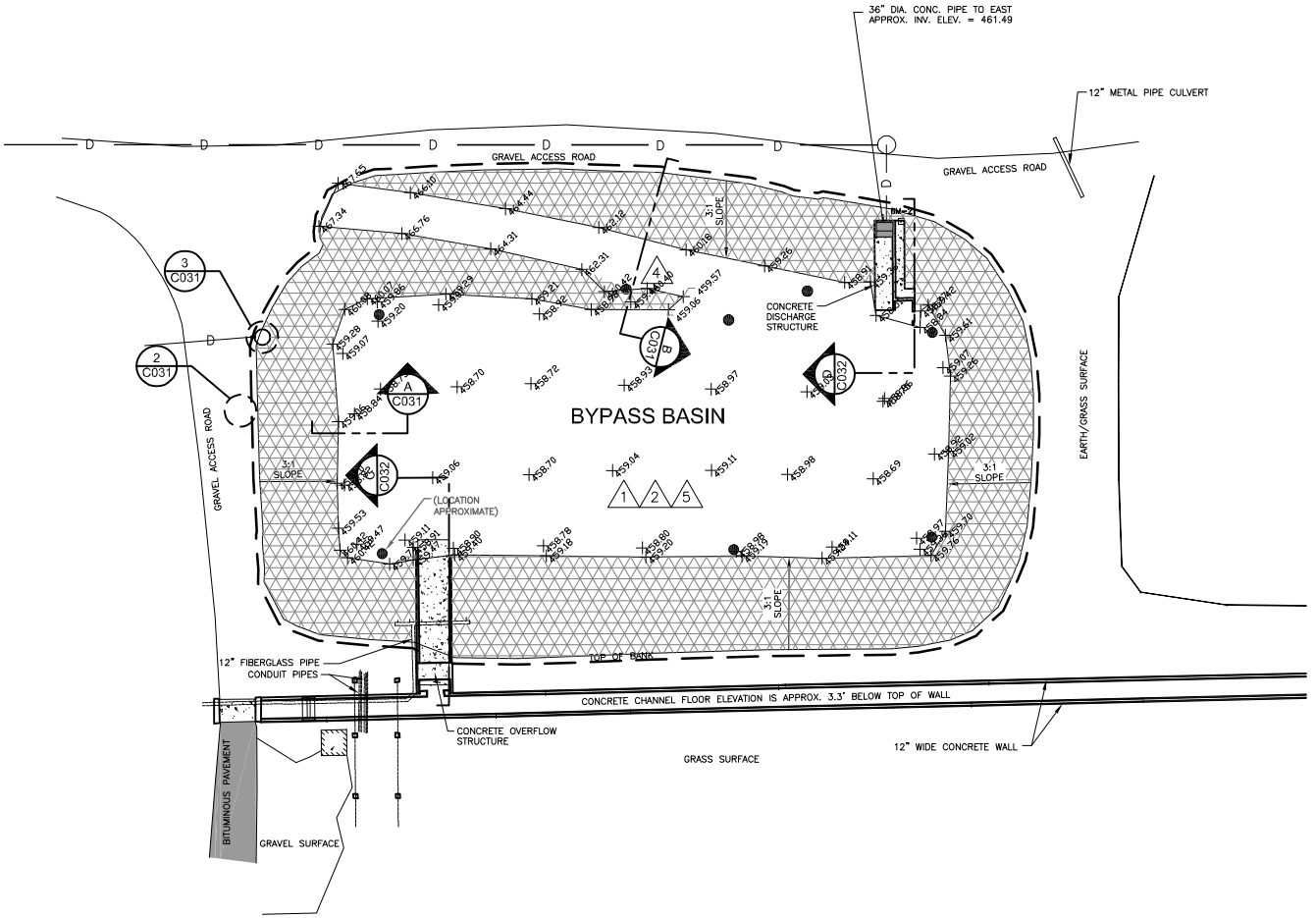
PROJECT NO.	1965/5.4
DRAWN BY:	KNW 06/30/10
CHECKED BY:	RJG 06/30/10
APPROVED BY:	HMS 06/30/10

LINER SUBGRADE PREPARATION

BYPASS BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

DRAWING NO: D1965C020-02
REFERENCE: .

SHEET NO. C020



LEGEND

- D — UNDERGROUND DISCHARGE PIPE
- ABOVEGROUND INTAKE PIPE
- ANCHOR TRENCH
- × 459.11 — TOP OF WARNING LAYER (ELEVATION, FT.)
- MARKER POST LOCATION
- BM-2 — BENCHMARK 2
- HDPE GEOMEMBRANE

HORIZONTAL DATUM:
ILLINOIS STATE PLANE COORDINATE SYSTEM, WEST ZONE, NAD83.

VERTICAL DATUM:
LOCAL PLANT DATUM

BENCHMARK 2:
NORTHEAST CORNER OF CONCRETE DISCHARGE STRUCTURE. CHISELED "+" IN CONCRETE ELEVATION 468.75 FT.

CONTRACTOR NOTES: △

1. CONTRACTOR SHALL INSTALL 60 MIL HDPE, WHITE, TEXTURED GEOMEMBRANE IN ACCORDANCE WITH THE TECHNICAL SPECIFICATION PRIOR TO PLACEMENT OF THE WARNING LAYER. CONTRACTOR SHALL PROVIDE AND FOLLOW AN APPROVED GEOMEMBRANE LAYOUT PLAN.
2. GEOMEMBRANE SHALL BE ANCHORED INTO 2.5 FEET DEEP TRENCHES ALONG TOP OF BASIN BANK, AS SHOWN ON SHEET C031. CONTRACTOR SHALL ADVISE OWNER AND/OR ENGINEER IF PROPOSED LOCATION FOR ANCHOR TRENCH IS NOT POSSIBLE.
3. CONTRACTOR SHALL PLACE 12-OZ. NON-WOVEN GEOTEXTILE, CUSHION MATERIAL AND WARNING LAYER MATERIAL OVER THE GEOMEMBRANE AT BASE AND 4 FEET ON SIDE SLOPES FOLLOWING ENGINEER APPROVAL AND PASSING QUALITY CONTROL RESULTS IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS (SEE SHEET C031).
4. CONTRACTOR SHALL PLACE 2 LAYERS OF 12-OZ. NONWOVEN GEOTEXTILE, CUSHION AND WARNING LAYER MATERIALS OVER THE GEOMEMBRANE ON THE RAMP, AS SHOWN ON SHEET C031.
5. RESTORE AREAS DISTURBED BY EQUIPMENT AND MATERIAL LAYDOWN.
6. CONTRACTOR SHALL PROVIDE SURVEY DOCUMENTATION OF THE ITEMS LISTED IN THE TECHNICAL SPECIFICATIONS.
7. CONTRACTOR SHALL PERFORM A LEAK LOCATION SURVEY IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS.

SOURCE NOTES:
THIS DRAWING WAS DEVELOPED FROM A SURVEY MAURER STUTZ, INC. DATED SEPTEMBER 7, 2010, DRAWING NO. 23210023.
LOCATION OF BASIN AND ACCESS RAMP TAKEN FROM MIDWEST GENERATION DRAWING NO. 5295 C5001-2, DATED 6-26-1980.
BASIN SUBGRADE AND SITE IMPROVEMENTS FROM A SURVEY PROVIDED BY MILLENNIA PROFESSIONAL SERVICE, MARCH 2011.

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SCALE IN FEET

	REVISION:	DATE:	APP'D BY:
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2.	RECORD DOCUMENTATION	06/08/11	HMS
1.	ISSUED FOR BID	10/06/10	HMS
0.	ISSUED FOR PERMIT	06/30/10	HMS

NATURAL RESOURCE TECHNOLOGY

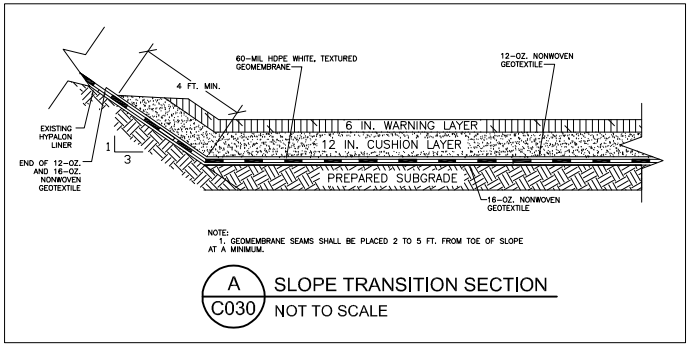
PROJECT NO. 1965.5/5.4
DRAWN BY: KNW 06/30/10
CHECKED BY: RJG 06/30/10
APPROVED BY: HMS 06/30/10

WARNING LAYER PLAN

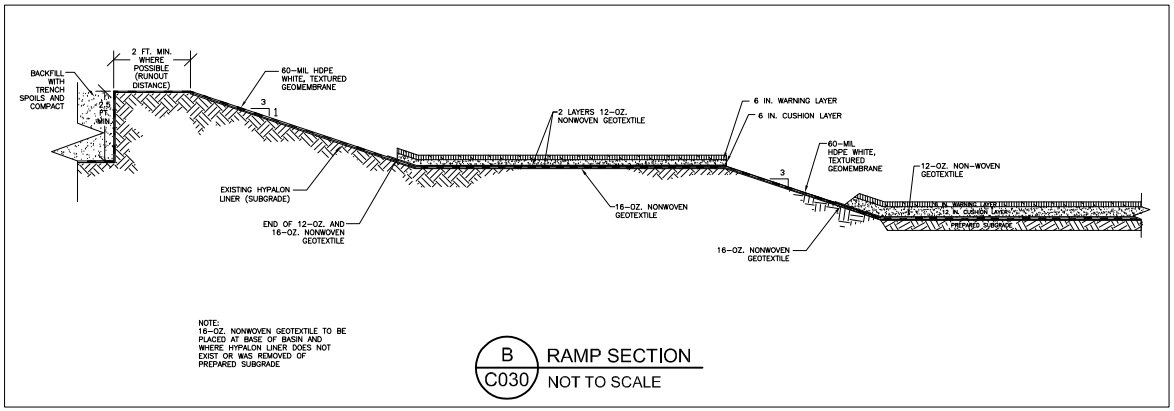
BYPASS BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

DRAWING NO: D1965C030-02
REFERENCE: .

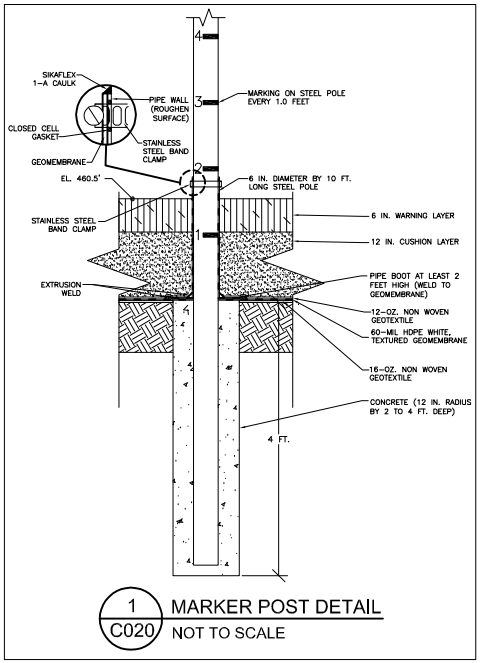
SHEET NO. C030



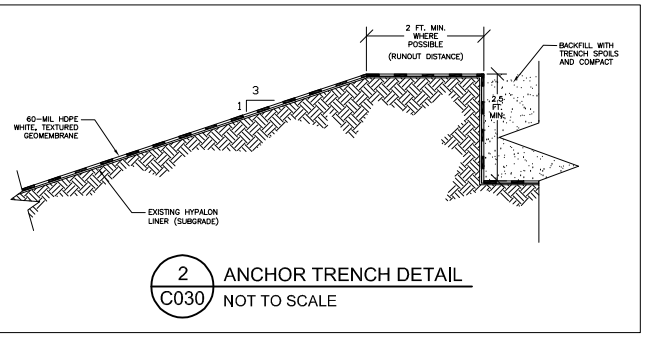
A / C030 SLOPE TRANSITION SECTION
NOT TO SCALE



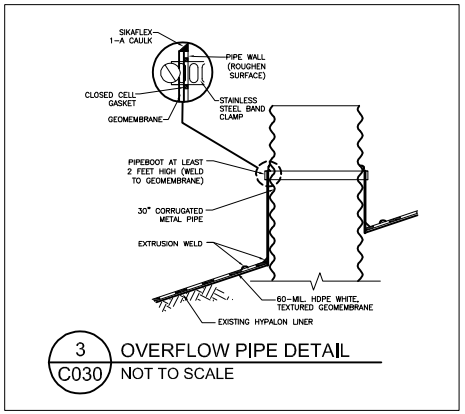
B / C030 RAMP SECTION
NOT TO SCALE



1 / C020 MARKER POST DETAIL
NOT TO SCALE



2 / C030 ANCHOR TRENCH DETAIL
NOT TO SCALE



3 / C030 OVERFLOW PIPE DETAIL
NOT TO SCALE

NOT FOR CONSTRUCTION

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2.	RECORD DOCUMENTATION	06/16/11	HMS
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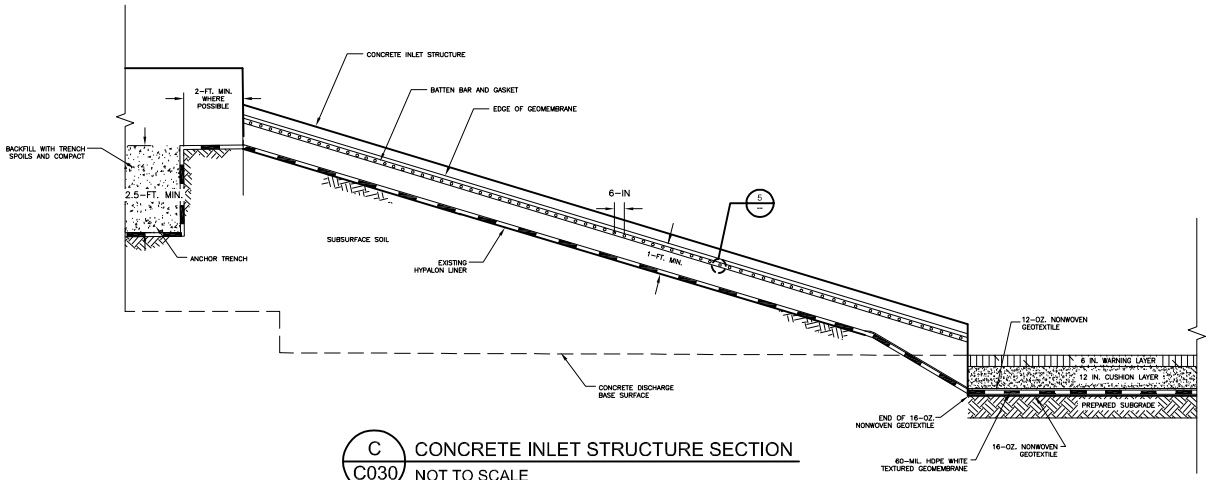
REVISION:		DATE:	APP'D BY:

NATURAL RESOURCE TECHNOLOGY

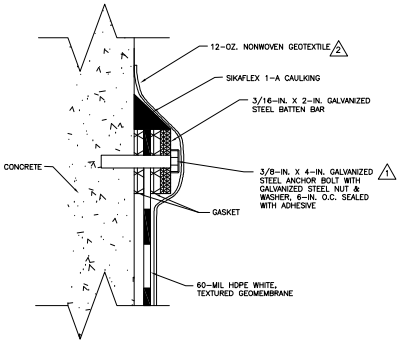
PROJECT NO.	1965/5.4
DRAWN BY:	KNW 06/30/10
CHECKED BY:	RJG 06/30/10
APPROVED BY:	HMS 06/30/10
DRAWING NO:	D1965C031-02
REFERENCE:	
SHEET NO.	C031

DETAILS AND SECTIONS

BYPASS BASIN LINER REPLACEMENT
MIDWEST GENERATION
POWERTON POWER STATION
PEKIN, ILLINOIS

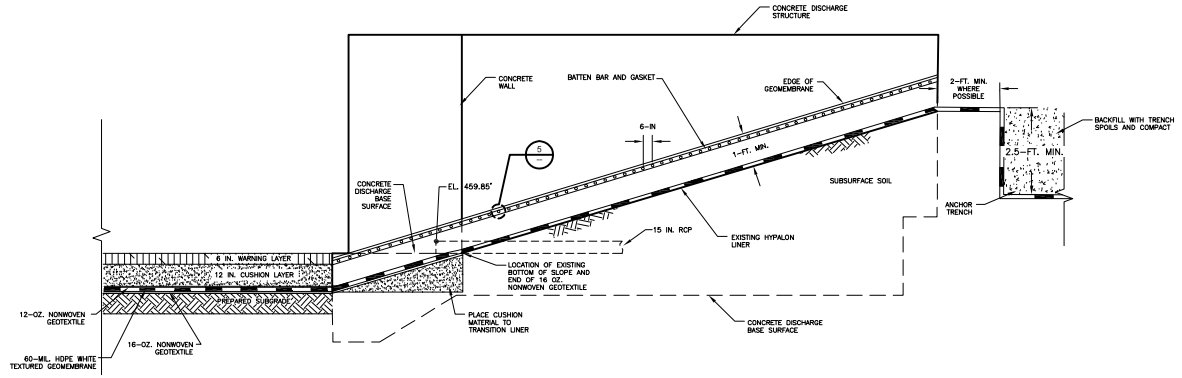


C / C030 CONCRETE INLET STRUCTURE SECTION
NOT TO SCALE



NOTE: △
1. ANCHOR BOLTS 6 IN. ON CENTER.
2. 12-OZ. NONWOVEN GEOTEXTILE TO BE USED TO PROTECT GEOMEMBRANE BELOW CUSHION/WARNING LAYERS.

5 / -- BATTEN BAR ATTACHMENT
NOT TO SCALE



D / - CONCRETE DISCHARGE STRUCTURE SECTION
NOT TO SCALE

NOT FOR CONSTRUCTION

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2.	RECORD DOCUMENTATION	06/16/11	HMS
1.	ISSUED FOR BID	10/06/10	HMS
0.	ISSUED FOR PERMIT	06/30/10	HMS
REVISION:		DATE:	APP'D BY:

NATURAL RESOURCE TECHNOLOGY

PROJECT NO. 1965/5.4	DETAILS AND SECTIONS
DRAWN BY: KNW 06/30/10	BYPASS BASIN LINER REPLACEMENT MIDWEST GENERATION POWERTON POWER STATION PEKIN, ILLINOIS
CHECKED BY: RJG 06/30/10	
APPROVED BY: HMS 06/30/10	DRAWING NO: D1965C032-02
	REFERENCE:
	SHEET NO. C032

APPENDIX C

Ash Surge Basin Liner Replacement Specifications

SECTION 02600
HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE

PART 1 - GENERAL

1.01 WORK INCLUDES

A. Furnish all labor, materials, tools, supervision, transportation, and installation equipment necessary for installation of 60-mil High Density Polyethylene (HDPE) geomembrane, as specified herein, and as shown on Contract Drawings.

1.02 REFERENCE STANDARDS

A. ASTM D5641 – Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber

B. ASTM D5820 – Standard Practice for Pressurized Air Channel Evaluation of Dual Seamed Geomembranes

C. ASTM D6392 –Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.

D. ASTM D7007 Standard Practice for Locating Leaks in Geomembranes Covered with Water or Earthen Materials.

E. GRI Test Method, GM 13 - Test Methods, Test Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes

F. GRI Test Method, GM 14 – Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using the Method of Attributes.

G. GRI Test Method, GM 19 – Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes.

1.03 DEFINITIONS

A. Geomembrane Installer: hired by Contractor responsible for field handling, transporting, storing, deploying, seaming and testing of the geomembrane seams.

B. Geomembrane Manufacturer: hired by Geomembrane Installer to provide HDPE geomembrane.

C. Leak Location Contractor: hired by Contractor and responsible for locating potential holes in the installed geomembrane using electrical methods.

D. Geosynthetic Quality Assurance Laboratory (Testing Laboratory): Laboratory, independent from the Owner, Manufacturer and Installer, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing, usually under the direction of the Owner.

E. Lot: A quantity of resin (usually the capacity of one rail car) used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.

F. Resin Supplier: selected by Geomembrane Manufacturer to provide resin used in manufacturing geomembrane.

G. Panel: Unit area of a geomembrane that will be seamed in the field that is larger than $100ft^2$.

H. Patch: Unit area of a geomembrane that will be seamed in the field that is less than $100ft^2$.

I. Subgrade Surface: Soil Layer surface which immediately underlies the geosynthetic material(s).

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Geomembrane Manufacturer shall have a minimum of 5 years of continuous experience manufacturing HDPE geomembrane totaling 1,000,000 square feet.

2. Geomembrane Installer:

a. 5 years of continuous experience in installation of HDPE geomembrane.

b. Experience totaling a minimum of 5,000,000 square feet of installed HDPE geomembrane on some combination of at least 10 completed facilities.

c. Personnel performing seaming operations qualified by experience or by successfully passing seaming tests. Master seamer shall have experience seaming a minimum of 3,000,000 square feet of geomembrane using same type of seaming apparatus to be used on this project.

d. Geomembrane Installers that are qualified and approved by Engineer are listed below:

i. Clean Air and Water Systems
Dousman, WI
Brain McKeown
262-965-4366

3. Leak Location Contractor:

a. 3 years of continuous experience in performing leak location surveys using electrical methods.

b. Experience totaling a minimum of 2,000,000 square feet of geomembrane leak location surveys on some combination of at least 5 completed facilities.

c. Personnel performing survey qualified by experience with at least 2 years of geomembrane testing experience using the leak location survey electrical method.

d. Leak Location Contractors that are qualified and approved by Engineer are listed below:

i. Leak Location Services, Inc.
San Antonio, TX
210-408-1241

ii. Or other approved by Owner and/or Engineer.

B. Quality Assurance Program:

1. Geomembrane Manufacturer/Installer shall conform with requirements of these Technical Specifications.

2. The Owner and/or Engineer may document geomembrane installation including panel placement, seaming, pre-qualification seam testing, non-destructive seam and repair testing, repair size and locations, and weather conditions.

3. The Owner may engage and pay for the services of Engineer and QA Laboratory to monitor geomembrane installation.

1.05 SUBMITTALS

A. Prior to project start, submit the following to Owner and/or Engineer in accordance with Section 01300, Submittals:

1. Raw Materials:

a. Name of Resin Supplier, location of supplier's production plant(s), resin brand name and product number.

b. Source and nature of plasticizers, fillers, carbon black and any other additives along with their percent addition to geomembrane material.

c. Test results documenting conformance with the "index properties" of GRI Test Method, GM 13.

2. Geomembrane Manufacturer's Certification:

a. Written certification that Geomembrane Manufacturer's Quality Control Plan was fully implemented during production of geomembrane material supplied for this project. (Submittal shall be made within 5 working days of delivery to site).

3. Geomembrane Manufacturer Production Information:

    a. Corporate background information indicating compliance with qualification requirements.

    b. Quality control plan for manufacturing.

    c. Copy of quality control certificates demonstrating compliance with the quality control plan for manufacturing and the test property requirements of GRI Test method, GM 13 (i.e., mill certificates).

4. Contractor shall provide the Engineer a certificate stating the name of the geotextile manufacturer, product name, chemical composition of the filaments and other pertinent information to fully describe the geotextile.

5. Geomembrane Installer's Seaming Personnel

    a. Training completed by personnel.

    b. Seaming experience for each personnel.

6. Geomembrane Installer's Information:

    a. Corporate background information indicating compliance with qualification requirements.

    b. List of completed facilities, totaling 5,000,000 square feet minimum for which Geomembrane Installer has completed installation of a HDPE geomembrane. Include name and purpose of facility, location, date of installation, and quantity installed.

    c. Resumes of personnel performing field seaming operation, along with pertinent experience information. Include documentation regarding which seamers are qualified to use thermal fusion welding apparatus.

    d. Installation quality control plan.

7. Installation panel layout diagram identifying placement of geomembrane panels, seams, and any variance or additional details which deviate from Contract Drawings or Technical Specifications. Layout shall be drawn to scale and shall be adequate for use as a construction plan. Layout shall include dimensions and pertinent seam and anchorage details.

B. With bid, submit the following to Owner and/or Engineer in accordance with Section 01300, Submittals

    1. Leak Location Contractor's Work Plan:

a. Corporate background information indicating compliance with qualification requirements.

b. List of completed facilities, totaling 2,000,000 square feet minimum of geomembrane leak location surveys on some combination of at least 5 completed facilities. Include name and purpose of facility, location, date of survey, survey method, and quantity surveyed.

c. Resumes of personnel performing leak location survey, along with pertinent experience information.

d. Leak Location Contractor quality control plan including description of the proposed survey methods and procedures, and field calibration procedures.

e. Leak Location Contractor's required site preparations to be completed to perform the proposed leak location survey, and estimated duration to complete the survey.

f. An example of a final report (per ASTM D 7007) provided by the Leak Location Contractor following the completion of the survey.

C. During installation, submit the following to the Owner and/or Engineer:

1. Daily records/logs prepared by Geomembrane Installer documenting work performed, personnel involved, general working conditions, and any problems encountered or anticipated on project. Submit on a weekly basis.

2. Copy of subgrade acceptance signed by Geomembrane Installer for areas to be covered with geomembrane each day.

D. Within 10 days of geomembrane installation completion, submit the following to Owner and/or Engineer:

1. Geomembrane installation certification that Work was performed under Geomembrane Installer's approved quality control plan and in substantial compliance with Technical Specifications and Contract Drawings.

2. As-built panel diagram identifying placement of geomembrane panels, seams, repairs, and destructive seam sample locations.

3. Copy of warranty for material (including factory seams) and installation covering both for a period of 2 years from the date of substantial completion.

E. The Owner and/or Engineer will review and inspect geomembrane installation upon completion of all Work specified in this Section. Deficiencies noted shall be corrected at no additional cost to the Owner.

F. The Owner and/or Engineer will provide written final acceptance of the geomembrane installation after completion of the leak location survey. Written conditional

geomembrane installation acceptance can be provided to the Contractor prior to completion of the leak location survey when the following conditions are satisfied, if necessary, and requested by the Contractor:

1. The entire geomembrane installation is completed or any pre-determined subsection if the project is phased.

2. All installation quality assurance/control documentation has been completed and submitted to the Owner and/or Engineer.

3. Verification of the adequacy of all field seams, repairs and associated testing is complete.

G. Within 14 days of completion of the leak location survey, submit final written report (per ASTM D 7007) of the leak location survey provided by Leak Location Contractor.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Transportation:

1. Geomembrane rolls shall be transported, unloaded and handled at the job site in accordance with manufacturer recommendations. Damaged material may be rejected by the Owner and/or Engineer.

B. On-site Storage:

1. Geomembrane rolls which have been delivered to job site shall be unloaded and stored in original, unopened packaging in a secure location, determined by Owner and/or Engineer.

2. Store geomembrane rolls to ensure adequate protection against exposure to the following:

a. Equipment;

b. Strong oxidizing chemicals, acids, or bases;

c. Flames, including welding sparks;

d. Temperatures in excess of 160 deg. F;

e. Dust;

f. Ultraviolet radiation (i.e. sunlight); and

g. Inclement weather.

3. Whenever possible, provide a 6-inch minimum air space between rolls.

4. Containers/rolls shall not be stacked.

C. On-Site Handling:

1. Handle rolls per Geomembrane Manufacturer's recommendations and as necessary to prevent damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Geotextile to be used for cushioning between subgrade and geomembrane shall be polyester or polypropylene, non-woven needlepunched fabric and shall conform to the following requirements:

GEOTEXTILE PROPERTIES

Property	Units	Value	Test	Criterion
Mass Per Unit Area	oz/yd^2	16	ASTM D5261	MARV
Puncture Strength	lb	170	ASTM D4833	MARV
Trapezoid Tear	lb	145	ASTM D4533	MARV
Grab Tensile Strength	lb	370	ASTM D4632	MARV
Grab Elongation	%	50	ASTM D4632	MARV
UV Resistance @500 hours	% retained	70	ASTM D4355	Minimum

B. Geotextile to be used for separation between geomembrane and cushion material shall be polyester or polypropylene, non-woven needlepunched fabric and shall conform to the following requirements:

GEOTEXTILE PROPERTIES

Property	Units	Value	Test	Criterion
Mass Per Unit Area	oz/yd^2	12	ASTM D5261	MARV
Apparent Opening Size	US Sieve	100	ASTM D4751	MARV
Puncture Strength	lb	210	ASTM D4833	MARV
Trapezoid Tear	lb	125	ASTM D4533	MARV
Grab Tensile Strength	lb	320	ASTM D4632	MARV
Grab Elongation	%	50	ASTM D4632	MARV
UV Resistance @500 hours	% retained	70	ASTM D4355	Minimum

C. High Density Polyethylene (HDPE) White Textured Geomembrane

1. HDPE geomembrane shall be white, textured (both sides), 60-mil product approved by the Owner and/or Engineer.

2. The Contractor shall submit, with the bid, written certification from the proposed Geomembrane Manufacturer that geomembrane products proposed in the bid satisfy the following requirements:

a. The proposed HDPE compound shall be comprised entirely of virgin materials. Compliance with this specification shall be documented in accordance with Geomembrane Manufacturer's quality control program

and submitted to the Owner and/or Engineer with the written conformance certification.

b. The proposed Geomembrane Manufacturer shall certify that any plasticizers, fillers and additives incorporated into the manufacturing process for the proposed HDPE geomembrane have demonstrated acceptable performance on past projects.

c. The proposed geomembrane shall meet the requirements of Geosynthetic Research Institute's test method GM 13.

d. The nominal thickness of proposed geomembrane shall be 60 mil., or as approved by the Owner and/or Engineer.

e. Geomembrane Manufacturer that are qualified and approved by Engineer are listed below:

i. GSE
Houston, TX
800 435 2008

3. Geomembrane sheets shall be visually consistent in appearance and shall contain no holes, blisters, undisbursed raw materials or other signs of contamination by foreign material. Geomembrane must have no striations, roughness or bubbles on the surface.

D. Seaming Apparatus

1. Thermal fusion welding machines used for joining geomembrane surfaces may be either extrusion or hot wedge. These machines shall include sufficient temperature and rate-of-travel monitoring devices to allow continuous monitoring of operating conditions.

2. One spare, operable thermal fusion seaming device shall be maintained on site at all times.

E. Field Test Equipment

1. Field Tensiometer: the field tensiometer shall be calibrated within three months prior to project start date over the range of field test values.

2. Air Channel Test Equipment: air channel test equipment shall consist of hoses, fittings, valves and pressure gauge(s) needed to deliver and monitor the pressure of compressed air through an approved pressure feed device.

3. Air Compressor: the air compressor utilized for field testing shall be capable of producing and maintaining an operating pressure of at least 50 psi.

4. Vacuum Box: the vacuum box shall consist of a vacuum gage, valve, and a gasket around the edge of the open bottom needed to apply vacuum to a surface.

2.02. CONFORMANCE TESTING REQUIREMENTS

A. Geomembrane shipped to site shall undergo conformance testing. Manufacturer's roll certificates may be used for conformance evaluation at the option of the Owner and/or Engineer. Nonconforming material shall either be retested at the direction of the Owner and/or Engineer or removed from site and replaced at Contractor's expense.

B. Conformance Test Methods

1. Samples will be located and collected by the Owner and/or Engineer at a rate of one sample per 100,000 square feet of geomembrane delivered to site.

2. One sample will be obtained from each geomembrane production batch delivered to the site.

3 Samples shall be cut by Geomembrane Installer and be at least 45 square feet in size.

4. Samples shall be tested in accordance with Table 1 (Smooth) or Table 2 (Textured) specified in GRI Test Method GM13.

5. Geomembrane thickness shall be measured a minimum of three times per panel during deployment to verify conformance with GRI Test Method GM13.

C. Role of Testing Laboratories

1. The Owner and/or Engineer will be responsible for acquiring samples of the geomembrane for conformance testing. The Owner or Engineer will retain an independent, third party laboratory to perform conformance testing on samples of geomembrane.

2. Retesting of geomembrane panels by the Geomembrane Installer because of failure to meet any of the conformance specifications can only be authorized by the Owner and/or Engineer.

3. The Geomembrane Manufacturer and/or Geomembrane Installer may perform independent tests in accordance with methods and procedures specified in GRI GM 13. Results shall not be substituted for quality assurance testing described herein.

D. Procedures for Determining Conformance Test Failures

1. If conformance test results fail to meet specifications, the roll and/or batch may be retested using specimens from either the original roll sample or from another sample collected by the Owner and/or Engineer. Two additional tests (retests)

shall be performed for each failed test procedure. Each retest shall consist of multiple specimen tests if multiple specimens are specified in the test procedure. If the results of both retests meet specifications, the roll and batch will be considered to have passed conformance testing.

2. Failure of any retest shall be cause for rejection of the entire roll or batch depending on the type of failing test. The Owner and/or Engineer reserves the right to collect samples from other rolls of a particular batch for further conformance testing. The Owner and/or Engineer may choose to accept only a portion of the batch on the basis of the results of conformance testing of samples collected from other rolls.

3. If retesting does not result in conformance with the specifications as defined in preceding paragraph, or if there are any other nonconformities with the material specifications, the Contractor shall remove the rolls from use in the project. The Contractor shall also be responsible for removal of rejected geomembrane from the site and replacement with acceptable geomembrane at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION MEETING

A. A Pre-Construction Meeting shall be held at the site to discuss and plan the details of geomembrane installation. This meeting shall be attended by the Geomembrane Installer, Owner, Engineer and the Contractor.

B. The following topics relating to geomembrane installation shall be addressed:

1. Responsibilities of each party.

2. Lines of authority and communication.

3. Methods for documenting, reporting and distributing documents and reports.

4. Procedures for packaging and storing archive samples.

5. Review of the schedule for all installation and quality assurance testing, including third-party testing turnaround times.

6. Review of panel layout, access and numbering systems for panels and seams including details for marking on the HDPE geomembrane.

7. Procedures and responsibilities for preparation and submittal of as-built drawings.

8. Temperature and weather limitations, installation procedures for adverse weather conditions and defining acceptable subgrade or ambient moisture and temperature conditions for working during liner installation.

9. Subgrade conditions, dewatering responsibilities and subgrade maintenance plan.

10. Deployment techniques including allowable subgrade for geomembrane.

11. Procedures for covering of the geomembrane to prevent damage.

12. Plan for minimizing wrinkles in the geomembrane.

13. Measurement and payment schedules.

14. Site health and safety procedures/protocols.

3.02 SUBGRADE INSPECTION AND REPAIR

A. The Geomembrane Installer shall visually inspect the subgrade immediately prior to geomembrane deployment. Inspection shall verify that there are no potentially harmful foreign objects present, such as sharp rocks and other deleterious debris. Any foreign objects encountered shall be removed by Geomembrane Installer or Contractor. All subgrade damaged by construction equipment and deemed unsuitable for geomembrane deployment shall be repaired prior to geomembrane deployment. All repairs shall be approved by the Owner and/or Engineer and Geomembrane Installer. The responsibility for preparation, repairs, and maintenance of the subgrade shall be defined in the preconstruction meeting. The Geomembrane Installer shall provide the Owner and/or Engineer with written acceptance of subgrade surface over which 16 oz non woven geotextile and geomembrane is deployed (Part 1.05C*)* for each day of deployment.

3.03 GEOMEMBRANE LINER DEPLOYMENT

A. Geomembrane Installer shall deploy 16-oz non woven geotextile following applicable certifications/quality control certificates listed in Subsection 1.05 of this section and approved by the Owner and/or Engineer. Any 16-oz non woven geotextile placed prior to approval by the Owner and/or Engineer shall be at the sole risk of the Contractor. If geotextile installed prior to approval by the Owner and/or Engineer does not meet the requirements of this specification, it shall be removed from the site at no additional cost to the Owner.

B. 60 mil HDPE geomembrane will be deployed following installation of 16-oz non woven geotextile and applicable certifications/quality control certificates listed in Subsection 1.05 of this section according to submitted panel layout drawing as approved by the Owner and/or Engineer. The Owner and/or Engineer is to be notified of and approve any revisions or modifications to the approved panel layout drawing prior to deploying geomembrane in the area of review.

C. Adequate temporary anchoring (sand bags, tires, etc.) that will not damage the geomembrane shall be placed on a deployed panel to prevent uplift by wind.

D. Geomembrane shall not be deployed if:

1. Ambient temperatures are below 41 degrees F (5 degrees C) or above 104 degrees F (40 degrees C) measured six inches above geomembrane surface unless approved by the Owner and/or Engineer.

2. Precipitation is expected or in the presence of excessive moisture or ponded water on the subgrade surface.

3. Winds are excessive as determined by Geomembrane Installer in agreement with the Owner and/or Engineer.

4. The Owner and/or Engineer will have the authority to suspend work during such conditions.

E. The Geomembrane Installer shall be responsible for conformance with the following requirements:

1. Equipment utilized for installation/quality assurance testing does not damage geomembrane. Such equipment shall have rubber tires and a ground pressure not exceeding 8 psi . Only equipment necessary for installation and quality assurance testing is allowed on the deployed geomembrane.

2. Personnel working on geomembrane do not damage geomembrane (activities such as smoking or wearing damaging clothing shall not be allowed).

3. Method of deployment does not damage geomembrane.

4. Method of deployment minimizes wrinkles.

5. Temporary loading or anchoring does not damage geomembrane.

6. Direct contact with geomembrane is minimized.

F. Geomembrane Installer shall place 16-oz non woven geotextile on the geomembrane at the base of the basin and at least 4 feet up side slopes, as indicated on Contract Drawings. Geomembrane Installer shall cover the batten bar attachments with the 16-oz non woven geotextile.

G. No vehicles shall be allowed on deployed geomembrane under any circumstances.

3.04 FIELD SEAMS

A. Seam Layout

1. In general, seams shall be oriented parallel to the line of the maximum slope. In corners and at other odd-shaped geometric intersections, number of seams should be minimized. If at all possible, seams shall not be located at low points in the subgrade unless geometry requires seaming to be done at these locations.

2. A seam numbering system compatible with the panel numbering system shall be agreed upon at the Pre-Construction Meeting.

B. Seaming Processes/Equipment

1. Approved processes for field seaming (panel to panel) are extrusion or hot wedge fusion-type seam methods. No other processes can be used without prior written authorization from the Owner and/or Engineer. Only equipment which has been specifically approved by make and model shall be used, if applicable.

2. The Geomembrane Installer will meet the following requirements regarding use, availability, and cleaning of welding equipment at job site:

   a. Intersecting hot wedge seams shall be patched using extrusion welding process.

   b. Electric generator for equipment shall be placed on a smooth base such that no damage occurs to geomembrane. A smooth insulating plate or fabric shall be placed beneath hot equipment after usage.

3. The Geomembrane Installer shall keep records for performance and testing of all seams.

C. Seaming Requirements/Procedures

1. Weather Conditions - Range of weather conditions under which geomembrane seaming can be performed are as follows:

   a. Unless otherwise authorized in writing by Owner and/or Engineer, no seaming shall be attempted or performed at an ambient temperature below 41 degrees F (5 degrees C) or above 104 degrees F (40 degrees C).

   b. Between ambient temperatures of 32 degrees F (0 degrees C) and 41 degrees F (5 degrees C), seaming shall follow GRI GM9 cold weather seaming guidelines. Pre-qualification seams shall be produced to determine appropriate seaming parameters and for Engineer's approval.

   c. Above 41 degrees F (5 degrees C), no special conditions will be required.

   d. Geomembrane shall be dry and protected from wind.

   e. Seaming shall not be performed during any precipitation event.

   f. Seaming shall not be performed in areas where ponded water has collected below surface of geomembrane.

2. If the Geomembrane Installer chooses to use methods which may allow seaming at ambient temperatures below 41 degrees F or above 104 degrees F, the Geomembrane Installer shall demonstrate and submit certification to Owner and/or Engineer that methods and techniques used to perform seaming produce seams that are equivalent to seams produced at temperatures above 41 degrees F and below 104 degrees F. The Owner and/or Engineer may deny approval for use of the proposed technique regardless of demonstration results.

3. Overlapping - Geomembrane panels shall have finished overlap as follows:

   a. Minimum of 6 inches for thermal fusion welding.

b. Insufficient overlap will be considered a failed seam.

4. Pre-qualification tests for geomembrane fusion welding shall be conducted by a minimum of 2 pre-qualification seams conducted per day per welding machine by each seaming technician performing welding with that machine. At least one test shall be performed at the start of each work day, with tests at intervals of no greater than 5 hours and additional pre-qualification tests following work interruptions, weather changes, changes to machine settings, or as directed by the Owner and/or Engineer. Pre-qualification seams shall be made under the same conditions as the actual seams.

   a. Pre-qualification seam samples shall be 5 feet long by 1-foot wide (minimum) after seaming, with seam centered along its length. Each pre-qualification seam shall be labeled with the date, geomembrane temperature, seaming unit identifier, seam number or test location, technician performing the test seam and description of testing results.

   b. Seam overlap shall be in accordance with Subsection 3.04(C)(3).

   c. Pre-qualification seams shall be inspected for proper squeeze-out, footprint pressure, and general appearance.

   d. Four specimens, each 1-inch in length, shall be cut from opposite ends of the pre-qualification seam sample by the Geomembrane Installer. The remainder of pre-qualification seam shall be retained by the Owner and/or Engineer and may be submitted for laboratory testing.

   e. The Geomembrane Installer shall complete two shear tests and two peel tests in accordance with GRI GM 19.

   f. Pre-qualification seams failed by inspection or testing may be retested at request of the Geomembrane Installer. If the second pre-qualification seam fails, then the seaming apparatus or seaming technique shall be disqualified from use until two consecutive, satisfactory pre-qualification seams are obtained.

5. Seam Preparation

   a. Prior to seaming, seam area shall be clean and free of moisture, dust, dirt, debris of any kind, and foreign material.

   b. Seams shall be aligned so as to minimize number of wrinkles and fishmouths.

6. General Seaming Procedures

a. Fishmouths or wrinkles at seam overlaps shall be cut along ridge of the wrinkle to achieve a flat overlap. Cut fishmouths or wrinkles shall be repaired, and/or patched in accordance with Part 3.07.

b. Seaming shall extend to the outside edge of geomembrane panels including material placed in anchor trenches.

c. The intersecting thermal fusion seams shall be patched using the extrusion welding process.

3.05 NON-DESTRUCTIVE TESTING

A. Each field seam shall be non-destructively tested over its entire length by the Installer. Testing shall be conducted as field seaming progresses, not at completion of all seams, unless specifically agreed to by the Owner and/or Engineer in writing.

B. Vacuum Testing – shall be performed in accordance with ASTM D5641.

C. Air Pressure Testing – shall be performed in accordance with ASTM D5820, and GRI GM 6, Pressurized Air Channel Test for Dual Seamed Geomembranes.

D. Each seam tested non-destructively shall be marked with the date of the test, name of the testing technician, length of the seam, test method and results. The same shall also be recorded by the Owner and/or Engineer on the appropriate CQA documentation.

E. Non-Destructive Seam Test Failures

1. Seams failing non-destructive testing shall be repaired by the Geomembrane Installer according to Part 3.07. Seams shall be non-destructively retested. If the seam defect cannot be located, the entire section of seam affected shall be repaired and retested.

3.06 ELECTRONIC LEAK LOCATION SURVEY

A. Leak Location Contractor shall identify actions required by Contractor to prepare the site for the leak location survey.

B. Contractor shall ensure that the cushion and warning layers, and 12 oz non woven geotextile above and 16 oz non woven geotextile below the geomembrane contains sufficient moisture to conduct a leak location survey. Typically, a moisture content of earth materials of 1% to 2% by weight is sufficient to conduct the survey. If the moisture content of the cushion layer, warning layer and subgrade is not sufficient per the requirements of the Leak Location Contractor, Contractor shall add moisture to the layers, as required.

C. Contractor shall provide electrical isolation of the metal marker posts, batten bars, and concrete structures, as requested by Leak Location Contractor.

D. Leak Location Contractor shall inspect the site prior to commencing the survey to ensure all site preparations are completed and the site conditions are appropriate for conducting the leak location survey.

E. Any discrepancy in the required site preparation detailed in the Leak Location Contractor's Work Plan or site conditions shall be reported to the Contractor for corrective or appropriate action.

F. After the warning layer is placed, conduct a leak location survey on the warning layer material using the procedures for surveys with earth materials covering the Geomembrane as described in ASTM D 7007.

G. A leak detection sensitivity test using an artificial leak shall be conducted on the geomembrane for each set of equipment used before the equipment is used on for the leak location survey, as described in ASTM D 7007 to determine the detection distance for the survey.

H. The leak location survey shall be taken on survey lines or on a grid spaced no farther apart than twice the leak detection distance as determined in the leak detection sensitivity test.

I. The Leak Location Contractor shall inform the Owner and/or Engineer and mark the locations of all identified or indicated leaks with a flag or spray paint. The Geomembrane Installer shall repair the defect/hole as detailed in Part 3.07 of this Section.

3.07 DEFECTS AND REPAIRS

A. The geomembrane shall be examined by the Geomembrane Installer and the Owner and/or Engineer for defects, holes, blisters, undispersed raw materials, and any signs of contamination by foreign matter. The geomembrane surface shall be swept and/or washed by the Geomembrane Installer if the amount of dust or mud inhibits examination. The Contractor shall provide a water truck, an operator, clean water and hoses as reasonably necessary to assist the Geomembrane Installer in this activity.

B. Portions of geomembrane exhibiting flaws, or failing a non-destructive or destructive (if conducted) test, shall be repaired or replaced by the Geomembrane Installer. Repair procedures available include:

1. Patching - used to repair large holes, tears, undispersed raw materials, contamination by foreign matter, holes resulting from destructive sampling (if conducted), and locations where seam overlap is insufficient;

2. Capping - used to repair large lengths of failed seams; and

3. Additional Procedures - used upon recommendation of the Geomembrane Installer if agreed to by the Owner and/or Engineer.

C. Patches or caps.

1. Extend patch or cap 6 inches (minimum) beyond the edge of the defect.

2. Round corners of patch and/or cap (suggest 3-inch radius).

3. Repair procedures, equipment, materials, and techniques will be approved by the Owner and/or Engineer prior to repair.

4. Geomembrane below large caps shall be appropriately cut to avoid water or gas collection between two sheets.

D. The Geomembrane Installer shall mark on the geomembrane (using a non-puncturing writing utensil), repair date, time, and personnel involved.

E. Each repair shall be non-destructively tested in accordance with Part 3.05. Large caps may require destructive test sampling in accordance with Part 3.06 at the discretion of the Owner and/or Engineer.

F. Repairs which fail testing shall be redone and retested until a passing result is obtained. The Geomembrane Installer will perform non-destructive testing on repairs and will document retesting of repairs.

G. The Owner and/or Engineer will document repairs, repair testing, and retesting results.

H. The Geomembrane Installer shall cut and seam wrinkles which may adversely affect long-term integrity of the geomembrane, hinder subsequent construction of overlying layers, or impede drainage off of the geomembrane after it is covered by soil. Seaming shall be done in accordance with procedures described in Parts 3.04(B) and 3.04(C), and it shall be subject to test provisions of Parts 3.05 (non-destructive testing) and 3.06 (destructive testing – if conducted).

3.08 PROTRUSIONS AND CONNECTIONS TO GEOMEMBRANE

A. If required, the Geomembrane Installer shall install geomembrane around utility poles, guy wires, and other structures according to the Contract Drawings and the following requirements:

1. Use minimum 2-ft long geomembrane pipe boots and steel clamps to seal the geomembrane around pole or structure.

2. Use standard welding procedures to seam the geomembrane boot or weld strip to the geomembrane.

3. Seaming performed on and around penetrations, and other appurtenances shall be non-destructively tested using the vacuum testing method.

3.09 SURVEY DOCUMENTATION

A. Prior to covering the geomembrane, the Geomembrane Installer shall provide the Contractor , Owner and/or Engineer with 24-hour notification to conduct a survey. The Contractor shall survey the location of all seams (panel corners acceptable), and repairs. The Contractor shall provide survey data to the Owner and/or Engineer within two

working day of survey completion and in accordance with Section 01050, Field Engineering and Survey.

3.10 DAILY FIELD INSTALLATION REPORTS

A. At the beginning of each day, the Geomembrane Installer shall provide the Owner and/or Engineer with a report for all work completed the previous day.

B. The Daily Field Installation Report shall include the following:

1. The total amount and location of geomembrane placed.

2. The total length and location of seams completed, technician name and welding unit numbers.

3. A drawing or sketch depicting the geomembrane installed the previous day including the panel number, seam number and locations of non-destructive and destructive testing (if conducted).

4. Results of pre-qualification test seams, if available.

5. Results of non-destructive testing.

C. Destructive test results (if conducted) shall be reported within 48 hours or prior to covering the geomembrane, whichever is practical.

END OF SECTION

APPENDIX D

Bypass Liner Replacement Specifications

SECTION 02600
HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE

PART 1 - GENERAL

1.01 WORK INCLUDES

A. Furnish all labor, materials, tools, supervision, transportation, and installation equipment necessary for installation of 60-mil High Density Polyethylene (HDPE) geomembrane, as specified herein, and as shown on Contract Drawings.

1.02 REFERENCE STANDARDS

A. ASTM D6392 –Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods.

B. ASTM D7007 Standard Practice for Locating Leaks in Geomembranes Covered with Water or Earthen Materials.

C. GRI Test Method, GM 13 - Test Methods, Test Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes

D. GRI Test Method, GM 14 – Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using the Method of Attributes.

E. GRI Test Method, GM 19 – Seam Strength and Related Properties of Thermally Bonded Polyolefin Geomembranes.

1.03 DEFINITIONS

A. Geomembrane Installer: hired by Contractor or Owner responsible for field handling, transporting, storing, deploying, seaming and testing of the geomembrane seams.

B. Geomembrane Manufacturer: hired by Geomembrane Installer, Contractor, or Owner to provide HDPE geomembrane.

C. Leak Location Contractor: hired by Contractor or Owner and responsible for locating potential holes in the installed geomembrane using electrical methods.

D. Geosynthetic Quality Assurance Consultant: Consultant, independent from the Manufacturer, and Installer, responsible for field oversight of geosynthetics installation, and related testing, usually under the direction of the Owner.

D. Geosynthetic Quality Assurance Laboratory (Testing Laboratory): Laboratory, independent from the Manufacturer and Installer, responsible for conducting laboratory tests on samples of geosynthetics obtained at the site or during manufacturing, usually under the direction of the Owner.

D. Lot: A quantity of resin (usually the capacity of one rail car) used in the manufacture of geomembranes. Finished roll will be identified by a roll number traceable to the resin lot used.

E. Resin Supplier: selected by Geomembrane Manufacturer to provide resin used in manufacturing geomembrane.

F. Panel: Unit area of a geomembrane that will be seamed in the field that is larger than $100ft^2$.

G. Patch: Unit area of a geomembrane that will be seamed in the field that is less than $100ft^2$.

H. Subgrade Surface: Soil Layer surface which immediately underlies the geosynthetic material(s).

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Geomembrane Manufacturer shall have a minimum of 5 years of continuous experience manufacturing HDPE geomembrane totaling 1,000,000 square feet.

2. Geomembrane Installer:

a. 5 years of continuous experience in installation of HDPE geomembrane.

b. Experience totaling a minimum of 5,000,000 square feet of installed HDPE geomembrane on some combination of at least 10 completed facilities.

c. Personnel performing seaming operations qualified by experience or by successfully passing seaming tests. Master seamer shall have experience seaming a minimum of 3,000,000 square feet of geomembrane using same type of seaming apparatus to be used on this project.

3. Leak Location Contractor:

d. 3 years of continuous experience in performing leak location surveys using electrical methods.

e. Experience totaling a minimum of 2,000,000 square feet of geomembrane leak location surveys on some combination of at least 5 completed facilities.

f. Personnel performing survey qualified by experience with at least 2 years of geomembrane testing experience using the leak location survey electrical method.

B. Quality Assurance Program:

1. Geomembrane Manufacturer/Installer shall conform with requirements of these Technical Specifications.

2. The Owner or Contractor will engage and pay for the services of a Geosynthetic Quality Assurance Consultant and Laboratory to monitor geomembrane installation.

1.05 SUBMITTALS

A. Prior to project start, submit the following to Geosynthetic Quality Assurance Consultant in accordance with Section 01300, Submittals:

1. Raw Materials:

a. Name of Resin Supplier, location of supplier's production plant(s), resin brand name and product number.

b. Source and nature of plasticizers, fillers, carbon black and any other additives along with their percent addition to geomembrane material.

c. Test results documenting conformance with the "index properties" of GRI Test Method, GM 13.

2. Geomembrane Manufacturer's Certification:

a. Written certification that Geomembrane Manufacturer's Quality Control Plan was fully implemented during production of geomembrane material supplied for this project. (Submittal shall be made within 5 working days of delivery to site).

3. Geomembrane Installer's Seaming Personnel

a. Training completed by personnel.

b. Seaming experience for each personnel.

4. Geomembrane Manufacturer Production Information:

a. Corporate background information indicating compliance with qualification requirements.

b. Quality control plan for manufacturing.

c. Copy of quality control certificates demonstrating compliance with the quality control plan for manufacturing and the test property requirements of GRI Test method, GM 13 (i.e. mill certificates).

5. Geomembrane Installer's Information:

a. Corporate background information indicating compliance with qualification requirements.

b. List of completed facilities, totaling 5,000,000 square feet minimum for which Geomembrane Installer has completed installation of a HDPE geomembrane. Include name and purpose of facility, location, date of installation, and quantity installed.

c. Resumes of personnel performing field seaming operation, along with pertinent experience information. Include documentation regarding which seamers are qualified to use thermal fusion welding apparatus.

d. Installation quality control plan.

6. Installation panel layout diagram identifying placement of geomembrane panels, seams, and any variance or additional details which deviate from Contract Drawings or Technical Specifications. Layout shall be drawn to scale and shall be adequate for use as a construction plan. Layout shall include dimensions and pertinent seam and anchorage details.

7. Installation Sequence and Schedule shall be included as part of Construction Progress Schedule.

8. Description of seaming apparatus to be used.

B. With bid, submit the following to Owner and/or Engineer in accordance with Section 01300, Submittals

1. Leak Location Contractor's Work Plan:

a. Corporate background information indicating compliance with qualification requirements.

b. List of completed facilities, totaling 2,000,000 square feet minimum of geomembrane leak location surveys on some combination of at least 5 completed facilities. Include name and purpose of facility, location, date of survey, survey method, and quantity surveyed.

c. Resumes of personnel performing leak location survey, along with pertinent experience information.

d. Leak Location Contractor quality control plan including description of the proposed survey methods and procedures, and field calibration procedures.

e. Leak Location Contractor's required site preparations to be completed to perform the proposed leak location survey, and estimated duration to complete the survey.

f. An example of a final report (per ASTM D 7007) provided by the Leak Location Contractor following the completion of the survey.

C. During installation, submit the following to the Geosynthetic Quality Assurance Consultant:

1. Daily records/logs prepared by Geomembrane Installer documenting work performed, personnel involved, general working conditions, and any problems encountered or anticipated on project. Submit on a weekly basis.

2. Copy of subgrade acceptance signed by Geomembrane Installer for areas to be covered with geomembrane each day.

D. Within 10 days of geomembrane installation completion, submit the following to Geosynthetic Quality Assurance Consultant:

1. Geomembrane installation certification that Work was performed under Geomembrane Installer's approved quality control plan and in substantial compliance with Technical Specifications and Contract Drawings.

2. As-built panel diagram identifying placement of geomembrane panels, seams, repairs, and destructive seam sample locations.

3. Copy of warranty for material (including factory seams) and installation covering both for a period of 2 years from the date of substantial completion.

E. The Geosynthetic Quality Assurance Consultant will review and inspect HDPE geomembrane installation upon completion of all Work specified in this Section. Deficiencies noted shall be corrected at no additional cost to the Owner.

F. The Geosynthetic Quality Assurance Consultant will provide written final acceptance of the geomembrane installation after completion of material placement above geomembrane. Written conditional geomembrane installation acceptance can be provided to the Contractor prior to completion of material placement above geomembrane when the following conditions are satisfied, if necessary, and requested by the Contractor:

1. The entire geomembrane installation is completed or any pre-determined subsection if the project is phased.

2. All installation quality assurance/control documentation has been completed and submitted to the Geosynthetic Quality Assurance Consultant or Owner.

3. Verification of the adequacy of all field seams, repairs and associated testing is complete.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Transportation:

1. Geomembrane rolls shall be transported, unloaded and handled at the job site in accordance with manufacturer recommendations. Damaged material may be rejected by the Geosynthetic Quality Assurance Consultant.

B. On-site Storage:

1. Geomembrane rolls which have been delivered to job site shall be unloaded and stored in original, unopened packaging in a secure location, determined by Owner and/or Geosynthetic Quality Assurance Consultant.

2. Store geomembrane rolls to ensure adequate protection against exposure to the following:

a. Equipment;

b. Strong oxidizing chemicals, acids, or bases;

c. Flames, including welding sparks;

d. Temperatures in excess of 160 deg. F;

e. Dust;

f. Ultraviolet radiation (i.e. sunlight); and

g. Inclement weather.

3. Whenever possible, provide a 6-inch minimum air space between rolls.

4. Containers/rolls shall not be stacked.

C. On-Site Handling:

1. Handle rolls per Geomembrane Manufacturer's recommendations and as necessary to prevent damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. High Density Polyethylene (HDPE) White Textured Geomembrane.

1. HDPE geomembrane shall be white, textured, 60-mil product approved by the Engineer and/or Geosynthetic Quality Assurance Consultant.

2. The Contractor shall submit, with the bid, written certification from the proposed Geomembrane Manufacturer that geomembrane products proposed in the bid satisfy the following requirements:

a. The proposed HDPE compound shall be comprised entirely of virgin materials. Compliance with this specification shall be documented in accordance with Geomembrane Manufacturer's quality control program and submitted to the Geosynthetic Quality Assurance Consultant with the written conformance certification.

b. The proposed Geomembrane Manufacturer shall certify that any plasticizers, fillers and additives incorporated into the manufacturing process for the proposed HDPE geomembrane have demonstrated acceptable performance on past projects.

c. The proposed geomembrane shall meet the requirements of Geosynthetic Research Institute's test method GM 13.

d. The nominal thickness of proposed geomembrane shall be 60 mil., or as approved by the Engineer and/or Geosynthetic Quality Assurance Consultant.

3. Geomembrane sheets shall be visually consistent in appearance and shall contain no holes, blisters, undisbursed raw materials or other signs of contamination by foreign material. Geomembrane must have no striations, roughness or bubbles on the surface.

B. Seaming Apparatus

1. Thermal fusion welding machines used for joining geomembrane surfaces may be either extrusion or hot wedge. These machines shall include sufficient temperature and rate-of-travel monitoring devices to allow continuous monitoring of operating conditions.

2. One spare, operable thermal fusion seaming device shall be maintained on site at all times.

C. Field Test Equipment

1. Field Tensiometer: the field tensiometer shall be calibrated within three months prior to project start date over the range of field test values.

2. Air Channel Test Equipment: air channel test equipment shall consist of hoses, fittings, valves and pressure gauge(s) needed to deliver and monitor the pressure of compressed air through an approved pressure feed device.

3. Air Compressor: the air compressor utilized for field testing shall be capable of producing and maintaining an operating pressure of at least 50 psi.

4. Vacuum Box: the vacuum box shall consist of a vacuum gage, valve, and a gasket around the edge of the open bottom needed to apply vacuum to a surface.

2.02. CONFORMANCE TESTING REQUIREMENTS

A. Geomembrane shipped to site shall undergo conformance testing. Manufacturer's roll certificates may be used for conformance evaluation at the option of the Geosynthetic Assurance Consultant. Nonconforming material shall either be retested at the direction of the Geosynthetic Quality Assurance Consultant or removed from site and replaced at Contractor's expense.

B. Conformance Test Methods

1. Samples will be located and collected by the Geosynthetic Quality Assurance Consultant at a rate of one sample per 100,000 square feet of geomembrane delivered to site.

2. One sample will be obtained from each geomembrane production batch delivered to the site.

3 Samples shall be cut by Geomembrane Installer and be at least 45 square feet in size.

4. Samples shall be tested in accordance with Table 1 (Smooth) or Table 2 (Textured) specified in GRI Test Method GM13.

5. Geomembrane thickness shall be measured a minimum of three times per panel during deployment to verify conformance with GRI Test Method GM13.

C. Role of Testing Laboratories

1. The Geosynthetic Quality Assurance Consultant will be responsible for acquiring samples of the geomembrane for conformance testing. The Owner or Geosynthetic Quality Assurance Consultant will retain an independent, third party laboratory to perform conformance testing on samples of geomembrane.

2. Retesting of geomembrane panels by the Geomembrane Installer because of failure to meet any of the conformance specifications can only be authorized by the Geosynthetic Quality Assurance Consultant. Non-conforming panels may be retested in accordance with Subsection 2.02(B) and 2.02(D) under authorization of the Geosynthetic Quality Assurance Consultant only.

3. The Geomembrane Manufacturer and/or Geomembrane Installer may perform independent tests in accordance with methods and procedures specified in Subsection 2.02(B). Results shall not be substituted for quality assurance testing described herein.

D. Procedures for Determining Conformance Test Failures

1. If conformance test results fail to meet specifications, the roll and/or batch may be retested using specimens from either the original roll sample or from another sample collected by the Geosynthetic Quality Assurance Consultant. Two additional tests (retests) shall be performed for each failed test procedure. Each retest shall consist of multiple specimen tests if multiple specimens are specified in the test procedure. If the results of both retests meet specifications, the roll and batch will be considered to have passed conformance testing.

2. Failure of any retest shall be cause for rejection of the entire roll or batch depending on the type of failing test. The Geosynthetic Quality Assurance Consultant reserves the right to collect samples from other rolls of a particular batch for further conformance testing. The Geosynthetic Quality Assurance Consultant may choose to accept only a portion of the batch on the basis of the results of conformance testing of samples collected from other rolls.

3. If retesting does not result in conformance with the specifications as defined in preceding paragraph, or if there are any other nonconformities with the material specifications, the Contractor shall remove the rolls from use in the project. The Contractor shall also be responsible for removal of rejected geomembrane from the site and replacement with acceptable geomembrane at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION MEETING

A. A Pre-Construction Meeting shall be held at the site to discuss and plan the details of geomembrane installation. This meeting shall be attended by the Geomembrane Installer, Owner, Engineer and the Contractor.

B. The following topics relating to geomembrane installation shall be addressed:

1. Responsibilities of each party.

2. Lines of authority and communication.

3. Methods for documenting, reporting and distributing documents and reports.

4. Procedures for packaging and storing archive samples.

5. Review of the schedule for all installation and quality assurance testing, including third-party testing turnaround times.

6. Review of panel layout, access and numbering systems for panels and seams including details for marking on the HDPE geomembrane.

7. Procedures and responsibilities for preparation and submittal of as-built drawings.

8. Temperature and weather limitations, installation procedures for adverse weather conditions and defining acceptable subgrade or ambient moisture and temperature conditions for working during liner installation.

9. Subgrade conditions, dewatering responsibilities and subgrade maintenance plan.

10. Deployment techniques including allowable subgrade for geomembrane.

11. Procedures for covering of the geomembrane to prevent damage.

12. Plan for minimizing wrinkles in the geomembrane.

13. Measurement and payment schedules.

14. Site health and safety procedures/protocols.

3.02 SUBGRADE PREPARATION

A. Contractor shall prepare a subgrade surface in accordance with Section 02300, Earthwork.

B. The Contractor shall not excavate more than the amount of anchor trench required for one day of geosynthetics deployment, unless otherwise specified by the Geosynthetic Quality Assurance Consultant. Rounded corners shall be provided in the trenches where the geosynthetics enter the trench to allow them to be uniformly supported by the subgrade and to avoid sharp bends. The geosynthetics shall not be supported by loose soils in anchor trenches.

C. The Geomembrane Installer shall visually inspect the subgrade immediately prior to geomembrane deployment. Inspection shall verify that there are no potentially harmful foreign objects present, such as sharp rocks and other deleterious debris. Any foreign objects encountered shall be removed by Geomembrane Installer or Contractor. All subgrade damaged by construction equipment and deemed unsuitable for geomembrane deployment shall be repaired prior to geomembrane deployment. All repairs shall be approved by the Geosynthetic Quality Assurance Consultant and Geomembrane Installer. The responsibility for preparation, repairs, and maintenance of the subgrade shall be defined in the preconstruction meeting. The Geomembrane Installer shall provide the Geosynthetic Quality Assurance Consultant with written acceptance of subgrade surface over which geomembrane is deployed (Part 1 .05C) for each day of deployment.

3.03 GEOMEMBRANE DEPLOYMENT

A. Geomembrane shall not be deployed until all applicable certifications/quality control certificates listed in Subsection 1.05 of this section and conformance testing listed in Subsection 2.02 of this section are submitted and approved by the Geosynthetic Quality Assurance Consultant. Any geomembrane deployed prior to approval by the Geosynthetic Quality Assurance Consultant shall be at the sole risk of the Geomembrane Installer and/or Contractor. If material installed prior to approval by the Geosynthetic Quality Assurance Consultant does not meet the requirements of this specification, it shall be removed from the site at no additional cost to the Owner.

B. Geomembrane will be deployed according to submitted panel layout drawing as approved by the Geosynthetic Quality Assurance Consultant. The Geosynthetic Quality Assurance Consultant is to be notified of and approve any revisions or modifications to the approved panel layout drawing prior to deploying geomembrane in the area of review.

C. Adequate temporary anchoring (sand bags, tires, etc.) that will not damage the geomembrane shall be placed on a deployed panel to prevent uplift by wind.

D. Geomembrane shall not be deployed if:

1. Ambient temperatures are below 41 degrees F (5 degrees C) or above 104 degrees F (40 degrees C) measured six inches above geomembrane surface unless approved by the Geosynthetic Quality Assurance Consultant.

2. Precipitation is expected or in the presence of excessive moisture or ponded water on the subgrade surface.

3. Winds are excessive as determined by Geomembrane Installer in agreement with the Geosynthetic Quality Assurance Consultant.

4. The Geosynthetic Quality Assurance Consultant will have the authority to suspend work during such conditions.

E. The Geomembrane Installer shall be responsible for conformance with the following requirements:

1. Equipment utilized for installation/quality assurance testing does not damage geomembrane. Such equipment shall have rubber tires and a ground pressure not exceeding 5 psi or total weight exceeding 750 lbs. Only equipment necessary for installation and quality assurance testing is allowed on the deployed geomembrane.

2. Personnel working on geomembrane do not damage geomembrane (activities such as smoking or wearing damaging clothing shall not be allowed).

3. Method of deployment does not damage geomembrane.

4. Method of deployment minimizes wrinkles.

5. Temporary loading or anchoring does not damage geomembrane.

6. Direct contact with geomembrane is minimized.

F. No vehicles shall be allowed on deployed geomembrane under any circumstances.

3.04 FIELD SEAMS

A. Seam Layout

1. In general, seams shall be oriented parallel to the line of the maximum slope. In corners and at other odd-shaped geometric intersections, number of seams should be minimized. If at all possible, seams shall not be located at low points in the subgrade unless geometry requires seaming to be done at these locations.

2. A seam numbering system compatible with the panel numbering system shall be agreed upon at the Pre-Construction Meeting.

C. Field Test Methods

1. Ten 1-inch-wide samples described above under Part 3.06(B)(3) shall be field tested for peel (5 samples) and shear (5 samples) in accordance with GRI GM 19.

2. One seam sample shall be field tested for peel and shear at the end of each continuous field seam 100 feet or greater in length.

3. Testing shall be performed in accordance with ASTM D6392 using a field tensiometer or equivalent device to qualitatively and quantitatively determine mode of failure.

4. Seam shall be considered passing if failure in both peel and shear meet criteria listed in GRI GM 19.

5. The procedures specified in Subsection 3.06(D) shall be implemented when sample passes field tensiometer test.

D. Laboratory Test Methods

1. Laboratory testing of seam samples shall be conducted by the Geosynthetic Quality Assurance Laboratory under contract with the Geosynthetic Quality Assurance Consultant or Owner. Five specimens shall be tested in shear and five in peel.

2. Laboratory testing shall be conducted in accordance with GRI GM 19.

3. For both seam shear and peel tension tests, an indication will be given for each specimen tested which defines locus of failure.

4. For shear tests, the following values, along with the mean and standard deviation where appropriate, will be reported for each specimen tested:

   a. Maximum tension in pounds per square inch.

   b. Elongation at break (up to a tested maximum of 100 percent).

   c. Locus of failure using ASTM D6392 designations.

5. For peel tests, the following values, along with the mean and standard deviation where appropriate, will be reported for each specimen tested:

   a. Maximum tension in pounds per square inch.

   b. Seam separation (expressed as percent of original seam area).

c. Locus of failure.

6. Retesting of seams due to nonconformance with specifications may be performed at the discretion of the Geosynthetic Quality Assurance Consultant.

E. Destructive Seam Test Failure

1. Shear and peel test results derived from testing described in Parts 3.06(C) and 3.06(D) shall comply with GRI GM 19 for seam to be considered acceptable.

2. The Geomembrane Installer has two options in determining the repair boundary whenever a seam has failed destructive testing:

a. The seam can be reconstructed between the two previously tested and passed destructive sample locations; or,

b. The Geomembrane Installer can trace the welding path to an intermediate location at least ten feet from point of failed test in each direction and obtain destructive test samples collected from these locations. If destructive tests on these samples are acceptable, then the seam shall be reconstructed between the intermediate locations. If either sample fails, the process may be repeated until an acceptable seam test has been performed on both sides of the original failed sample. If a passing sample is not realized on one (or both) side of the original failed sample, then seam repair must extend to the end(s) of the seam. Retesting of seams according to this procedure shall utilize the sampling methodology described in Part 3.06(B). The Owner reserves the right to terminate this process, at the discretion of the Geosynthetic Quality Assurance Consultant, after the second retesting. An additional sample taken from the reconstructed zone must pass destructive seam testing if destructive sample failure(s) causes reconstruction.

3. The Geosynthetic Quality Assurance Consultant shall be responsible for documenting all actions taken in repairing seams. The Geomembrane Installer will be responsible for keeping the Geosynthetic Quality Assurance Consultant informed of seaming progress.

4. Additional fees for destructive seam test failures shall be assessed to the Contractor and deducted from payment. This fee shall be assessed only if the failing sample is a laboratory sample.

3.07 ELECTRONIC LEAK LOCATION SURVEY

A. The Owner shall have the option to conduct an electronic leak location survey. Leak location survey shall be performed by the Leak Location Contractor under the observation of the Geosynthetic Quality Assurance Consultant.

B. Leak Location Contractor shall identify actions required by Contractor to prepare the site for the leak location survey.

C. Contractor shall ensure that the layers above and below the geomembrane contains sufficient moisture to conduct a leak location survey. Typically, a moisture content of earth materials of 1% to 2% by weight is sufficient to conduct the survey. If the moisture content of layers above and/or below the geomembrane is not sufficient per the requirements of the Leak Location Contractor, Contractor shall add moisture to the layers, as required.

D. Contractor shall provide electrical isolation of the metal marker posts, batten bars, and concrete structures, as requested by Leak Location Contractor.

E. Leak Location Contractor shall inspect the site prior to commencing the survey to ensure all site preparations are completed and the site conditions are appropriate for conducting the leak location survey.

F. Any discrepancy in the required site preparation detailed in the Leak Location Contractor's Work Plan or site conditions shall be reported to the Contractor for corrective or appropriate action.

G. After the final layer is placed above the geomembrane, conduct a leak location survey on the final layer material using the procedures for surveys with earth materials covering the Geomembrane as described in ASTM D 7007.

H. A leak detection sensitivity test using an artificial leak shall be conducted on the geomembrane for each set of equipment used before the equipment is used on for the leak location survey, as described in ASTM D 7007 to determine the detection distance for the survey.

I. The leak location survey shall be taken on survey lines or on a grid spaced no farther apart than twice the leak detection distance as determined in the leak detection sensitivity test.

J. The Leak Location Contractor shall inform the Owner and/or Engineer and mark the locations of all identified or indicated leaks with a flag or spray paint. The Geomembrane Installer shall repair the defect/hole as detailed in Part 3.08 of this Section.

3.08 DEFECTS AND REPAIRS

A. The geomembrane shall be examined by the Geomembrane Installer and the Engineer for defects, holes, blisters, undispersed raw materials, and any signs of contamination by foreign matter. The geomembrane surface shall be swept and/or washed by the Geomembrane Installer if the amount of dust or mud inhibits examination. The

Contractor shall provide a water truck, an operator, clean water and hoses as reasonably necessary to assist the Geomembrane Installer in this activity.

B. Portions of geomembrane exhibiting flaws, or failing a non-destructive or destructive (if conducted) test, shall be repaired or replaced by the Geomembrane Installer. Repair procedures available include:

1. Patching - used to repair large holes, tears, undispersed raw materials, contamination by foreign matter, holes resulting from destructive sampling (if conducted), and locations where seam overlap is insufficient;

2. Capping - used to repair large lengths of failed seams; and

3. Additional Procedures - used upon recommendation of the Geomembrane Installer if agreed to by the Engineer.

C. Patches or caps.

1. Extend patch or cap 6 inches (minimum) beyond the edge of the defect.

2. Round corners of patch and/or cap (suggest 3-inch radius).

3. Repair procedures, equipment, materials, and techniques will be approved by the Geosynthetic Quality Assurance Consultant prior to repair.

4. Geomembrane below large caps shall be appropriately cut to avoid water or gas collection between two sheets.

D. The Geomembrane Installer shall mark on the geomembrane (using a non-puncturing writing utensil), repair date, time, and personnel involved.

E. Each repair shall be non-destructively tested in accordance with Part 3.05. Large caps may require destructive test sampling in accordance with Part 3.06 at the discretion of the Geosynthetic Quality Assurance Consultant.

F. Repairs which fail testing shall be redone and retested until a passing result is obtained. The Geomembrane Installer will perform non-destructive testing on repairs and will document retesting of repairs.

G. The Geosynthetic Quality Assurance Consultant will document repairs, repair testing, and retesting results.

H. The Geomembrane Installer shall cut and seam wrinkles which may adversely affect long-term integrity of the geomembrane, hinder subsequent construction of overlying layers, or impede drainage off of the geomembrane after it is covered by soil. Seaming shall be done in accordance with procedures described in Parts 3.04(B) and 3.04(C), and it shall be subject to test provisions of Parts 3.05 (non-destructive testing) and 3.06 (destructive testing – if conducted).

3.09 PROTRUSIONS AND CONNECTIONS TO GEOMEMBRANE

A. If required, the Geomembrane Installer shall install geomembrane around utility poles, guy wires, and other structures according to the Contract Drawings and the following requirements:

1. Use minimum 1-ft long geomembrane pipe boots and steel clamps to seal the geomembrane around pole or structure.

2. Use standard welding procedures to seam the geomembrane boot to the geomembrane.

3. Seaming performed on and around penetrations, and other appurtenances shall be non-destructively tested using the vacuum testing method.

3.10 SURVEY DOCUMENTATION

A. The Geomembrane Installer shall survey the completed geomembrane prior to covering and provide the Geosynthetic Quality Assurance Consultant with 24-hour notification of survey. The Contractor shall document the location of all seams (panel corners acceptable), destructive test samples (if conducted) and repairs. The Contractor shall provide survey data to the Geosynthetic Quality Assurance Consultant within two working day of survey completion.

3.11 DAILY FIELD INSTALLATION REPORTS

A. At the beginning of each day, the Geomembrane Installer shall provide the Geosynthetic Quality Assurance Consultant with a report for all work completed the previous day.

B. The Daily Field Installation Report shall include the following:

1. The total amount and location of geomembrane placed.

2. The total length and location of seams completed, technician name and welding unit numbers.

3. A drawing or sketch depicting the geomembrane installed the previous day including the panel number, seam number and locations of non-destructive and destructive testing (if conducted).

4. Results of pre-qualification test seams, if available.

5. Results of non-destructive testing.

C. Destructive test results (if conducted) shall be reported within 48 hours or prior to covering the geomembrane, whichever is practical.

3.12 MATERIAL ABOVE GEOMEMBRANE

A. The Geosynthetic Quality Assurance Consultant and Geomembrane Installer shall verify the area of geomembrane completion prior to placement of material over the geomembrane.

B. Soils - Apply following general criteria for covering of the geomembrane:

1. Do not place soils on the geomembrane at an ambient temperature below 32 degrees F, (0 degrees C) nor above 104 degrees F (40 degrees C), unless otherwise specified.

2. Do not drive equipment used for placing soil directly on the geomembrane.

3. A minimum thickness of 1 foot of soil is specified between a low ground pressure dozer (maximum contact pressure of 5 lb/sq. inch) and the geomembrane.

4. A minimum thickness of 2 feet of soil is required between rubber-tired vehicles and the geomembrane.

5. Do not compact soils placed directly on geomembrane.

6. Damage to the geomembrane resulting from placement of cover soils shall be repaired in accordance with Part 3.08 by the Geomembrane Installer at the Contractor's expense.

7. Do not push soil downslope. Soil shall be placed over the geomembrane starting from base of the slope, up to top of the slope.

END OF SECTION

Attachment 3

Revised Emergency Action Plan

January 2024

EMERGENCY ACTION PLAN
ASH SURGE BASIN, BYPASS BASIN, and METAL CLEANING BASIN
POWERTON STATION
JANUARY 2024

The Emergency Action Plan (EAP) was initially prepared by Civil & Environmental Consultants, Inc. (CEC) pursuant to 40 CFR 257.73(a)(3) for the Ash Surge Basin and Bypass Basin at the Midwest Generation, LLC (MWG) Powerton Station (Station) in Pekin, Illinois. This EAP has been revised to comply with 35 Ill. Adm. Code Part 845, Subpart E, §845.520 by revising the code references and including the Metal Cleaning Basin as well as to address comments by the Illinois Environmental Protection Agency (IEPA). Previous assessments performed in accordance with §257.73(a)(2) identified the Ash Surge Basin and the Ash Bypass Basin as significant hazard potential Coal Combustion Residual (CCR) surface impoundments, and as a result, this written EAP has been prepared to address a potential failure of the Ash Surge Basin and Bypass Basin along with the Metal Cleaning Basin. The Metal Cleaning Basin was not originally included in the hazard potential assessment, but the relative location of the Metal Cleaning Basin allows for the failures and the result of the failures for the Ash Surge Basin and Bypass Basin to be applied to the Metal Cleaning Basin. The EAP is presented as follows:

Section 1.0: §845.520(b)(1) Definition of the events or circumstances involving the CCR unit(s) that represent a safety emergency, along with a description of the procedures that will be followed to detect a safety emergency in a timely manner;

Section 2.0: §845.520(b)(2); Definition of the responsible persons, their respective responsibilities, and notification procedures in the event of a safety emergency involving the CCR unit(s);

Section 3.0: §845.520(b)(3); Contact information of emergency responders;

Section 4.0: §845.520(b)(4); Provide Site Maps, which delineate the downstream areas which would be affected in the event of the Basins failure and a physical description of the CCR Units;

Section 5.0: §845.520(b)(5); Include provisions for an annual face-to-face meeting or exercise between representatives of the Powerton Station and the local emergency responders; and

Section 6.0: §845.520(e); The owner or operator of the CCR unit(s) must obtain a certification from a qualified professional engineer stating that the written EAP, and any subsequent amendment of the EAP, meets the requirements of 845.520.

1.0 DEFINITION OF THE EVENTS THAT REPRESENT A SAFETY EMERGENCY

In accordance with Section 845.520(b)(1), the attached tables define the events and/or circumstances involving the Basin$_s$ that represent a structural safety emergency, along with a description of the procedures that will be followed to detect a safety emergency in a timely manner.

The information provided in the Tables 1 through 4 provide a listing of problems which may occur at the Basin$_s$, how to make a rapid evaluation of the problem, and what action should be taken in response to the problem. This section presents only generalized information to aid in first response to a given problem. Suspected problems should be reported as soon as possible, as discussed in Section 2.0, and assistance from a qualified engineer should be obtained if necessary.

The problems outlined in the tables are related to above grade, earthen type embankment dams similar in construction to the Ash Surge Basin, Ash Bypass Basin, and the Metal Cleaning Basin. The problems discussed herein include:

- Table 1: Seepage
- Table 2: Sliding
- Table 3: Cracking
- Table 4: Animal Burrows and Holes

For each problem, the indicators are discussed followed by evaluation techniques and then by action items for each problem.

An additional safety emergency may also be caused by severe weather. The Basins exist outdoors and are exposed to elements where a weather emergency may occur. The following is the station's procedure for weather emergencies:

1.0 Upon receipt of a severe weather warning from a weather radio, internet, community siren, or by visual observation, the following precautions will be taken.

2.0 The Shift Supervisor will use radios and P.A. to notify each department. Pay attention to workers outside the main building and permanent structures.

3.0 Inform critical operating personnel that they should remain on the job in a secure location until notified to do otherwise by the Shift Supervisor.

4.0 Notify Administration Manager, Projects Manager, or Contract Administrators on site that severe weather is imminent.

5.0 Notify Security.

6.0 Notify all Contractor supervisors, managers and foremen. Instruct them to evacuate all personnel from trailers and temporary structures and to take shelter in the main power block between Units 5 and 6. This area is known as the old maintenance shop and store room window area.

7.0 All personnel, except Fuel Handling will be instructed to return to the main building and seek shelter in the following locations for a head count.

7.1 **Electrical Maintenance Shop** – Electrical Maintenance, Instrument Maintenance and Mechanical Maintenance, Operating, Storeroom.
7.2 **Electrical Maintenance Office** – Administration, Specialist, Planners.
7.3 **Outside Storeroom Window** – Visitors, Janitors, Security, Contractors.
7.4 **Lower level of Car Dumper; C-1 or C-2 Tunnels** – Fuel Handling

8.0 When the warning is lifted, all employees, visitors, and contractors shall report to their supervisors for a head count.

9.0 Inspect the plant facilities for damage.

9.1 If the plant is damaged:

9.1.1 Secure damaged areas to prevent access.

9.1.2 Make notifications as necessary (Refer to 13.4.2).

2.0 RESPONSIBLE PERSONS, RESPECTIVE RESPONSIBILITIES, AND NOTIFICATION PROCEDURES

The EAP must be implemented once events or circumstances involving the CCR unit that represent a safety emergency are detected, including conditions identified during periodic structural stability assessments, annual inspections, and inspections by a qualified person. In accordance with §845.520(b)(2), the following sections define responsible persons, their respective responsibilities, and notification procedures in the event of a safety emergency involving the Ash Surge Basin, Bypass Basin, and/or the Metal Cleaning Basin. Contact information is provided in Table 5, attached.

2.1 Responsible Persons and Responsibilities

Appropriate parties will be notified based on the nature and severity of the incident as determined by the Station Environmental Specialist or Chemical Specialist. If failure is

imminent or has occurred, notification and mitigation procedures are a top priority, particularly for a potentially hazardous situation. The Station Environmental Specialist or Chemical Specialist, in conjunction with the Station Director, is responsible for this determination.

2.2 Notification Sequence

The following notification procedures shall be used by employees in the event of a safety emergency with the Ash Surge Basin, Bypass Basin, and/or the Metal Cleaning Basin.

(1) Notify the Shift Supervisor and Environmental Specialist, Chemical Specialist, or alternate.

(2) If unsafe conditions exist, the employee should evacuate the area.

(3) Only the Environmental Specialist, Chemical Specialist, Corporate Environmental or designated alternate shall have any official communication with non-employees or regulatory agencies, and only the Communications Director shall have any contact with the media.

The Environmental Specialist, Chemical Specialist, or designated alternate should follow these procedures in the event of a safety emergency involving the Ash Surge Basin and/or Bypass Basin:

(1) Organize appropriately trained Station personnel and/or other employees or contractors as necessary to assist with the safety emergency.

(2) After consultation with appropriately trained Station personnel, contact the proper civil authorities (e.g., fire, police, etc.) if necessary. Notify the appropriate agencies where there has been a reportable release of material(s) into the environment. See Table 5, attached for contact information. Notify MWG Corporate via the Intelex online notification system within 24 hours in the event of a reportable release. A reportable release is a Material Release defined as a spill or leak that materialized in the waterway. A Non-Material Release is a spill or leak that did not come into contact with the waterway.

(3) Be prepared to evacuate the inundation area at any time during the safety emergency response.

(4) If the emergency is beyond the Facility's response capabilities, contact one or more emergency response contractors as necessary.

(5) Corrective actions should only be performed by properly trained individuals.

2.3 Emergency Responders Contact Information

In accordance with §845.520(b)(3), Table 5, attached, provides contact information of emergency responders. The Station Environmental Specialist, Chemical Specialist, or alternate will determine who to notify, including any affected residents and/or businesses, in the case of an imminent or actual CCR surface impoundment dam failure. The Station Environmental Specialist, Chemical Specialist, or alternate will ensure proper notifications are made.

Appropriate contractors will be utilized to assist the Station Environmental Specialist, Chemical Specialist or alternate with mitigated actions being undertaken in order to minimize the impact of an event that has occurred. Contact information for contractors and consultants are provided in Table 5.

3.0 SITE MAP AND A SITE MAP DELINEATING THE DOWNSTREAM AREA

In accordance with §845.520(b)(4), the following section provides a physical description of the Ash Surge Basin, Bypass Basin, and the Metal Cleaning Basin. A Site Vicinity Map is provided as Figure 1, a Site Plan for the Ash Surge Basin, Bypass Basin, and the Metal Cleaning Basin is provided as Figure 2. Drawings depicting the locations of, and the downstream areas affected by, a potential failure of the Ash Surge Basin and Bypass Basin were prepared by Geosyntec in October 16, 2016 and are provided in Appendix A.

3.1 Basin Locations and Descriptions

The Ash Surge Basin, Bypass Basin and Metal Cleaning Basin are located in the eastern portion of Powerton Station (see Figure 1) northeast of the Main Power Block Building situated between the Old Intake Channel and the Former Ash Basin. The Bypass Basin is immediately southeast of the Ash Surge Basin. The Metal Cleaning Basin is immediately west of the Ash Surge Basin.

From CEC's observations and review of construction and engineering documentation provided by MWG, the Basins were constructed with elevated earthen berms or embankments. Run-on is limited to precipitation contained within the earthen berm. Physical characteristics of the Ash Surge Basin, Bypass Basin, and the Metal Cleaning Basin are provided in Table 6.

3.2 Delineation of Downstream Areas

The potential impacts from failure of the Ash Surge Basin and Bypass Basin were evaluated and reported by Geosyntec in the Hazard Potential Classification Assessment (HPCA), dated October 2016. A copy of the HPCA is contained on the CCR Rule Compliance Data and Information web site (http://www.nrg.com/legal/coalcombustion-residuals/).

Results of the HPCA indicate that both the Ash Surge Basin and Bypass Basin are classified as significant hazard potential CCR surface impoundments. The evaluation reports no loss of life resulting from failure of the Basin embankments is probable because no occupied buildings are located within the anticipated inundation areas. However, potential failure during flood conditions could result in offsite economic or environmental impacts. Inundation Maps are provided in Appendix A.

Reviewing the location of the Metal Cleaning Basin, it is reasonable to conclude that no loss of life would occur resulting from a failure of the Metal Cleaning Basin embankments because no occupied buildings are located downstream.

4.0 ANNUAL FACE-TO-FACE MEETING

In accordance with §845.520(b)(5), a face-to-face meeting or an exercise between representatives of the Powerton Station and the local emergency responders shall be offered and, if accepted, held on an annual basis. The purpose of the annual meeting is to review the EAP to assure that contacts, addresses, telephone numbers, etc. are current. The annual meeting will be held whether or not an incident occurred in the previous year. In the event an incident occurs, the annual meeting date may be moved up in order to discuss the incident closer to the date of occurrence. If no incidents have occurred, the annual meeting will be held to inform local emergency responders on the contents of the EAP and changes from the previous year. Documentation of the annual face to face meeting will be recorded and placed in the operating record for the Station.

5.0 LIMITATIONS AND CERTIFICATION

This EAP was prepared to initially meet the requirements of 257.73(a)(3) and was previously prepared by CEC in April 2017 to address the Ash Surge Basin and the Bypass Basin. This EAP has been updated to include the Metal Cleaning Basin, comments from IEPA, and the remainder was reviewed by KPRG for compliance with 35 Ill. Adm. Code 845.520(b). KPRG's review of the EAP is based solely on the observations of the conditions observed by KPRG personnel and information provided to KPRG by Midwest Generation. This review neither accepts nor rejects the safety emergencies identified by CEC. The structural safety emergencies identified along with the responses are the product of CEC. KPRG has not altered the structural safety emergencies or the responses associated with each emergency. As such, the Emergency Action Plan complies with 35 Ill. Adm. Code 845.520(b).

Signature:

Name: Joshua D. Davenport, P.E.

Date of Certification: 1/26/2024

Illinois Professional Engineer No. 062.061945

License Expires: 11/30/2025

FIGURES

W:\projects\midwest generation\operating permit\powerton\figures\eap map.dwg

ENVIRONMENTAL CONSULTATION & REMEDIATION

K P R G

KPRG and Associates, inc.

414 Plaza Drive, Suite 106 Westmont, Illinois 60559 Telephone 630-325-1300 Facsimile 630-325-1593

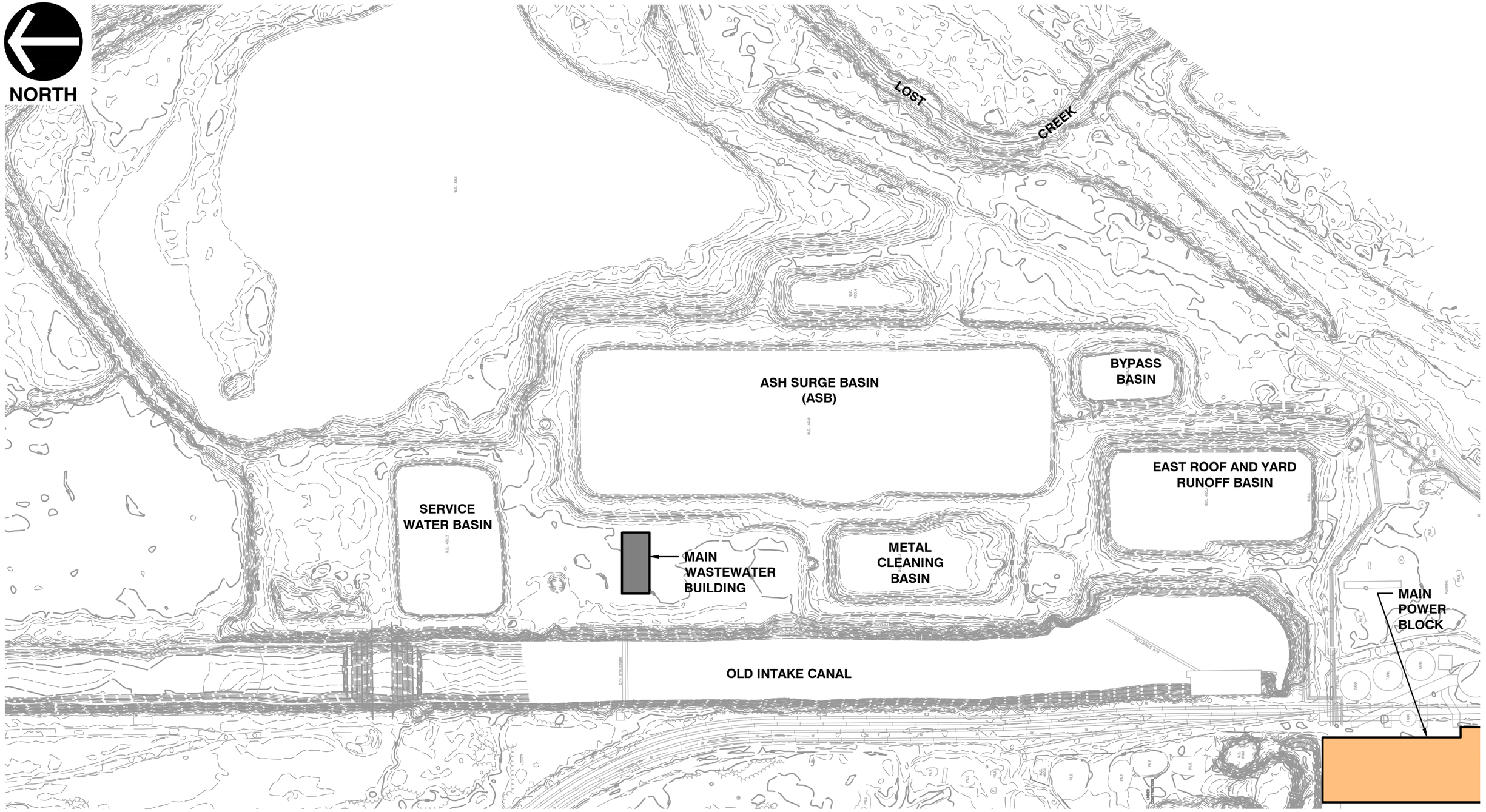
14665 West Lisbon Road, Suite 1A Brookfield, Wisconsin 53005 Telephone 262-781-0475 Facsimile 262-781-0478

SITE MAP

POWERTON GENERATING STATION
PEKIN, ILLINOIS

Scale: 1" = 550' | Date: October 20, 2021

KPRG Project No. 19520 | FIGURE 1



REFERENCE

1. TOPOGRAPHIC INFORMATION SOUTH OF SECONDARY ASH SETTLING BASIN AND FAB IS BASED ON AERIAL SURVEY PERFORMED BY AEROMETRIC, INC. DATED JUNE 19, 2008. TOPOGRAPHY NORTH OF ASH SURGE BASIN IS BASED ON SURVEY BY RIDGELINE CONSULTANTS PERFORMED IN FEBRUARY AND MARCH 2016.

LEGEND

- OCCUPIED STRUCTURE
- UNOCCUPIED STRUCTURE
- TOPOGRAPHY (1-FOOT INTERVAL)

*HAND SIGNATURE ON FILE

SCALE IN FEET

0 200 400

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POWERTON STATION
ASH SURGE BASIN - BYPASS BASIN
PEKIN, ILLINOIS

SITE PLAN

DRAWN BY:	MSK	CHECKED BY:	MDJ	APPROVED BY:	MDJ*	FIGURE NO.:	2
DATE:	04/05/2017	DWG SCALE:	1"=200'	PROJECT NO:	163-469.0100		

P:\2016\163-469\-CADD\Dwg\CV01-Powerton Station\163469-CV01-C102-Site Plan.dwg[LAYOUT1] LS:(3/9/2017 - ccase) - LP: 4/5/2017 1:26 PM

TABLES

Table 1: Ash Surge Basin, Ash Bypass Basin, and Metal Cleaning Basin
Event Definition, Evaluation and Action: Seepage

Definition	Evaluation	Action
1A: Wet area on downstream embankment slope or other area downstream of the embankment, with very little or no surface water or very minor seeps.	1B: Condition may be caused by infiltration of rain water, which is not serious; or may be the start of a serious seepage problem, which would be indicated by a quick change to one of the conditions below.	1C: No immediate action required. Note the location for future comparison.
2A: Same wet area as above, with moderate seeps of clear or relatively clear water and the rate of flow not increasing.	2B: Measure the flow periodically and note changes in clarity.	2C: No immediate action required. Note the location, flow rate, and clarity for future comparison. During reservoir flood stages, the seepage area should be watched for changes.
3A: Same wet area as above, with moderate seeps of clear or relatively clear water and rate of flow increasing.	3B: Measure the flow periodically and note changes in clarity. Inspect downstream area for new seeps.	3C: Contact a qualified engineer for immediate inspection (see Table 5). Observe the condition constantly for further changes in flow rate or clarity, unless notified otherwise by the engineer.
4A: Piping (seepage with the removal of materials from the foundation or embankment), moderate to active flows of cloudy to muddy water.	If the water is cloudy to muddy, and the rate of flow is increasing, this condition could lead to failure of the dam. If, along the piping, there is an upstream swirl (whirlpool) caused by water entering through the abutments of embankment, failure is imminent.	4C: Immediate action is necessary. Notify the appropriate agencies (see Table 5).
5A: Boils (soil particles deposited around a water exit forming a cone, varying from a few inches in diameter spaced 2 to 3 feet apart to isolated locations several feet in diameter in the floodplain downstream of the dam) may show the types of flow as noted above.	5B: Evaluation of the problem is the same as noted above for the various flow conditions, i.e., clear and constant, clear and increasing, and cloudy or muddy and increasing.	5C: Actions to be taken are essentially the same as those noted above.

Table 2: Ash Surge Basin, Ash Bypass Basin, and Metal Cleaning Basin
Event Definition, Evaluation and Action: Sliding

Definition	Evaluation	Action
1A: Movement of a portion of the embankment, either the upstream or downstream slope, toward the toe of the dam.	1B: Various degrees of severity of a slide require different responses. The first condition is that the slide does not pass through the crest and does not extend into the embankment for more than 5 ft., measured perpendicular to the slope	1C: For this condition, a qualified engineer (see Table 5) should be consulted before repairs are initiated to determine the cause of the slide and to recommend modifications to prevent future slides. The downstream side of the dam should be watched for the emergence of water, either through the slide or opposite the slide. If water is noted discharging, the area should be treated as a seepage location and monitored as noted above.
2A: Slide passes is the second condition.	2B: In this condition, the slide passes through the crest and that the reservoir elevation is more than 10 ft. below the lowered crest.	2C: Use the same actions as noted above, and notify the appropriate MWG personnel (see Table 5) of the situation so they may be prepared to act if the condition worsens.
3A: Slide passes is also the third condition.	3B: In this condition, the slide passes through the crest and that the reservoir elevation is less than 10 ft. below the lowered crest.	3C: This condition is critical, and failure of the dam should be considered imminent. Notify the appropriate agencies (see Table 5).

Table 3: Ash Surge Basin, Ash Bypass Basin, and Metal Cleaning Basin
Event Definition, Evaluation and Action: Cracking

Definition	Evaluation	Action
1A: Cracks in the embankment can occur either in the longitudinal (along the length of the dam) or transverse (across the dam from upstream to downstream directions).	1B: Some cracking of the surface soils may occur when they become dry. This cracking is to be expected, and no further action is required.	1C: No further action is required**.**
2A: Longitudinal cracking can indicate the beginning of a slide or be an uneven settlement of the embankment.	2B: Monitor the crack for future changes, and contact a qualified engineer for assistance in the evaluation of the crack and recommended repairs.	2C: Contact a qualified engineer for assistance and recommendations (see Table 5).
3A: Transverse cracking can indicate uneven settlement or the loss of support below the crack. Such cracks usually occur over an outlet conduit, near the abutments, or in the taller portion of the embankment.	3B: Monitor the crack for future changes, and contact a qualified engineer for assistance in the evaluation of the crack and recommended repairs.	3C: Contact a qualified engineer for assistance and recommendations (see Table 5).

Table 4: Ash Surge Basin, Ash Bypass Basin, and Metal Cleaning Basin
Event Definition, Evaluation and Action: Animal Burrows and Holes

Definition	Evaluation	Action
1A: Holes in the embankment, varying in size from about one inch in diameter to one foot in diameter caused by animals.	1B: If the holes do not penetrate through the embankment, the situation is usually not serious. Some animal holes will have soil pushed out around the hole in a circular fashion, which may look like a boil (crayfish or crawdad). Watch for the movement of water and soil particles from these holes to determine whether they are boils.	1C: Backfill as deeply as possible with impervious material. If rodents become a nuisance, an effective rodent control program, as approved by the Illinois Department of Natural Resources District Wildlife Biologist, should be implemented.

Table 5: Midwest Generation Powerton Generating Station
CCR EAP Notification List – Updated September 2021

Plant Contacts:

Name	Title	Contact Info
Joseph Kotas	Environmental Specialist	(O) 309-477-5216 (C) 815-901-6549
Dale Green	Plant Manager	(O) 309-477-5212 (C) 309-620-3908
Todd Mundorf	Operations Manager	(O) 309-477-5215 (C) 847-456-4642
Mark Vannaken	Maintenance Manager	(O) 309-477-5221 (C) 309-824-5686
Sunish Shah	Engineering Manager	(O) 309-477-5243 (C) 773-410-3225
Bill Gaynor	Class K WWT Operator	(O) 309-477-5437 (C) 309-824-2999
Station Control Room	24-Hour, 7-day	309-477-5299

Corporate Support:

Name	Title	Contact Info
Sharene Shealey	Director, Environmental	(C) 724-255-3220
Jill Buckley	Environmental Manager	(C) 724-448-9732
Tony Shea	Sr. Director, Environmental	(O) 609-524-4923 (C) 609-651-6478
Dave Schrader	Sr. Manager, Communications (public point of contact)	(O) 267-295-5768 (C) 267-294-2860

Emergency Response Agencies:

Agency	Address	Contact Info
National Response Center (NRC) – US Army Corp of Engineers	Peoria Lock and Dam 1139 Wesley Rd, Creve Coeur, IL 61610	800-424-8802 (309) 699-6111 (local)
Illinois Department of Natural Resources, Office of Water Resources	One Natural Resources Way, 2nd Floor Springfield, IL 62702-1271	8:30 a.m.-5:00 p.m. 217-782-4427
Illinois Emergency Management Agency (IEMA)	2200 Dirksen Parkway Springfield, IL 62703	800-782-7860
Illinois Environmental Protection Agency (IEPA)	Bureau of Water 1021 North Grand Avenue East Springfield, IL 62794	217-782-3637
Tazewell County Emergency Management Agency Operations Center	21304 IL State Rt. 9 Tremont, IL 61568	Phone: 309-925-2271 24-hour: 309-477-2234
Tazewell County TC3: Dispatches to Fire, Police and Emergency Medical services	101 S Capitol Street Pekin, IL 61554	Emergency: 9-1-1 Non-Emergency: 309-478-5796
Pekin Police Department	111 S Capitol St #100 Pekin, IL 61554	Emergency: 9-1-1 Non-Emergency: 309-346-3132 Front Desk: 309-478-5330
Pekin Fire Department	3232 Court Street Pekin, IL 61554	Emergency: 9-1-1 Non-Emergency: 309-477-2388

Environmental Response Contractors/Consultants:

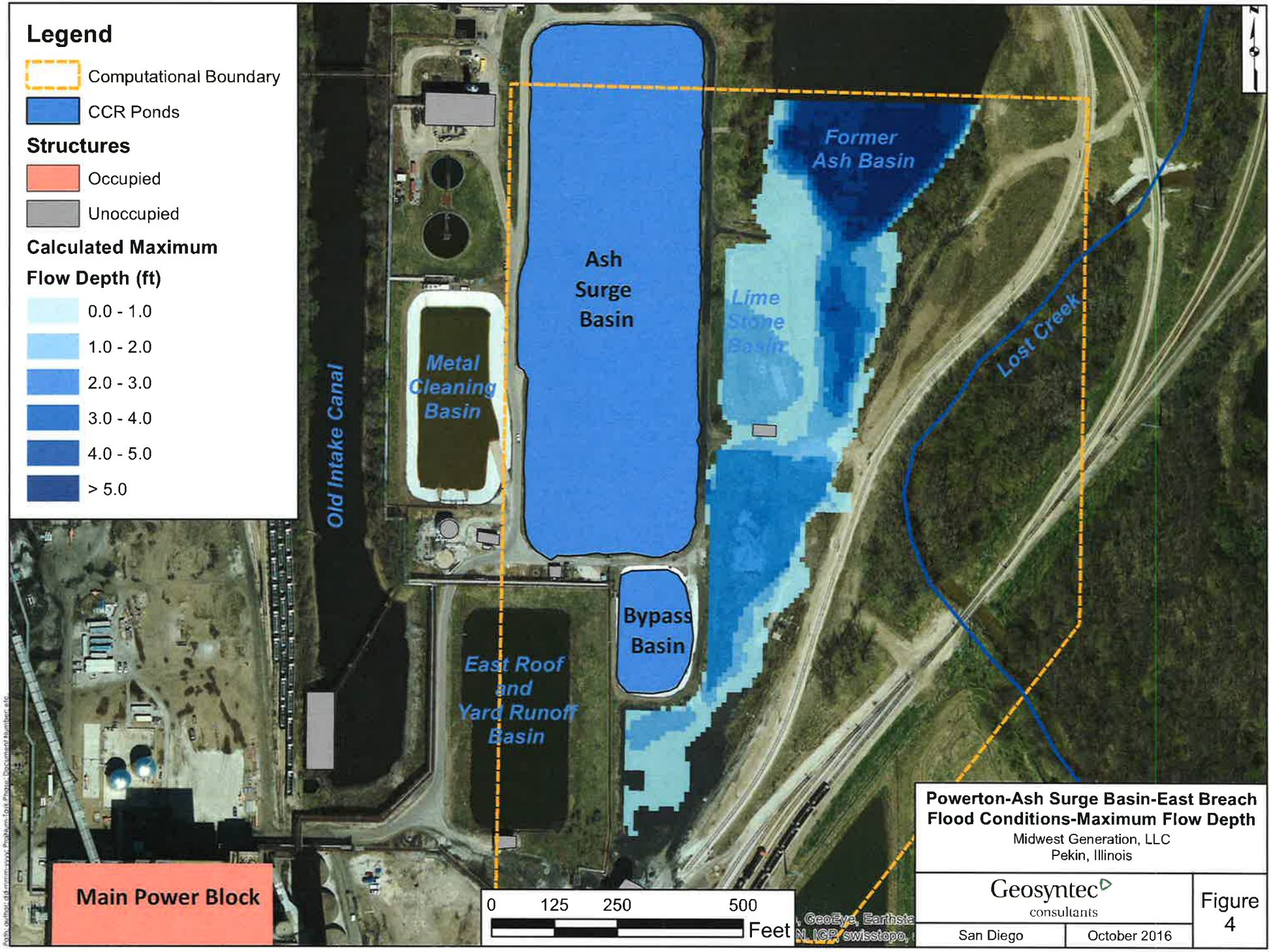
Contractor/Consultant	Address	Contact Info
Civil & Environmental Consultants, Inc.	555 Butterfield Road, Suite 300 Lombard, IL 60148	630-963-6026
Iron Hustler Excavating	1604 West Detweiller Drive Peoria, IL61615	309 691-9894
SET Environmental	450 Sumac Road Wheeling, IL 60090	847 850-1056 877-437-7455 (24-hr)
Heritage Environmental Services	15330 Canal Bank Road Lemont, IL 62095	630-739-1151

Table 6: Basin Characteristics

	Ash Surge Basin	Bypass Basin	Metal Cleaning Basin
Estimated Capacity (acre-feet)	92.1	5.1	14.0
Estimated Maximum Basin Depth (feet)	16	10	10
Elevation - Maximum Crest (ft msl.)	467.6	467.6	467.6

APPENDIX A

GEOSYNTEC HPCA INUNDATION MAPS



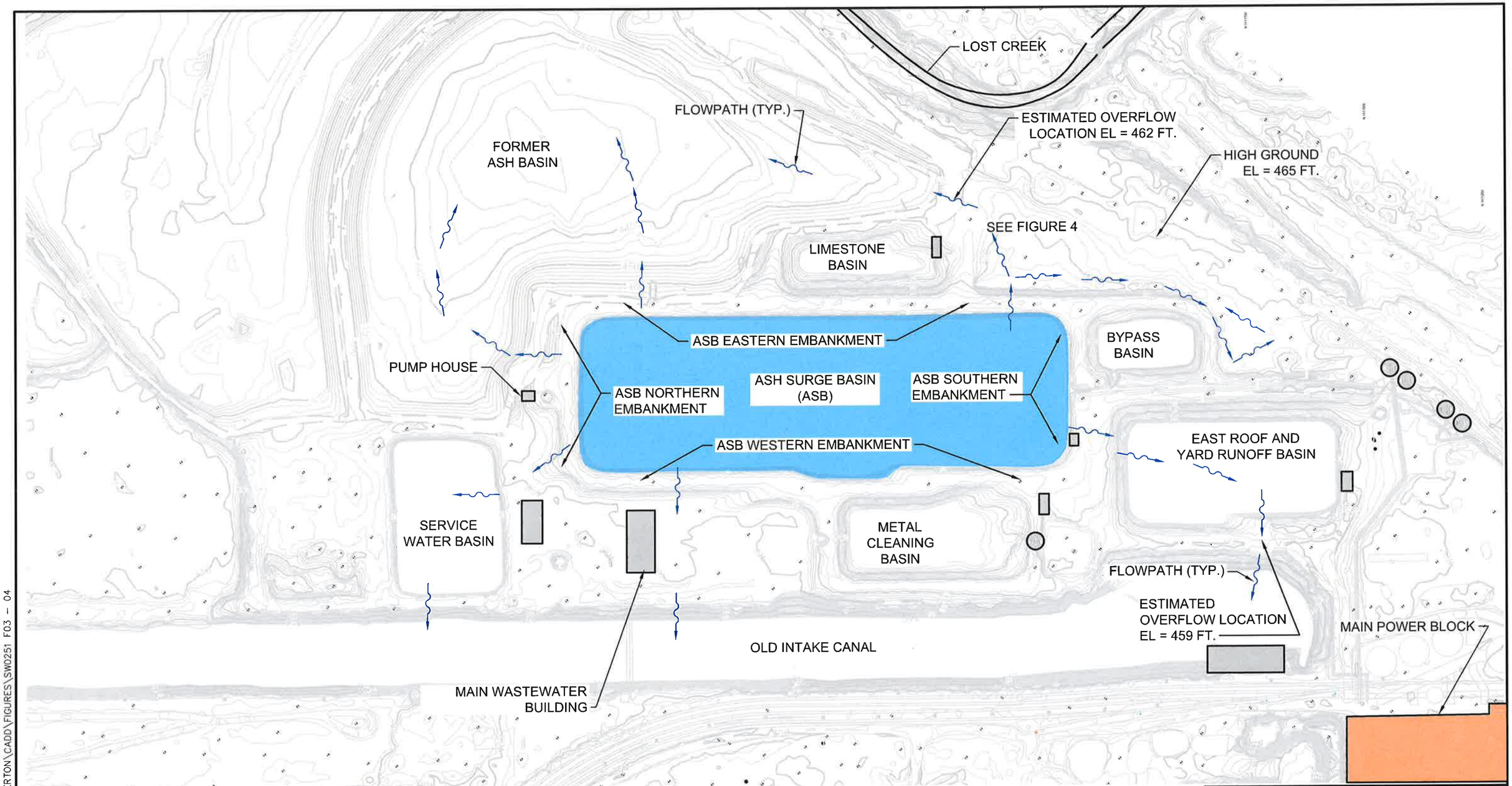
Powerton-Ash Surge Basin-East Breach Flood Conditions-Maximum Flow Depth

Midwest Generation, LLC
Pekin, Illinois

Geosyntec consultants

San Diego | October 2016

Figure 4



SOURCE OF SURVEY:

TOPOGRAPHY SOUTH OF SECONDARY ASH SETTLING BASIN AND FAB IS BASED ON AERIAL SURVEY PERFORMED BY AEROMETRIC, INC. DATED JUNE 19, 2008. TOPOGRAPHY NORTH OF ASH SURGE BASIN IS BASED ON SURVEY BY RIDGELINE CONSULTANTS PERFORMED IN FEBRUARY AND MARCH 2016.

NOTE:

1. TOPOGRAPHY SHOWN DOES NOT REFLECT MINOR REGRADING OF THE SLOPE EAST OF THE BYPASS BASIN PERFORMED IN FALL 2016.

LEGEND

STRUCTURES

OCCUPIED

UNOCCUPIED

N

0 200' 400'

SCALE IN FEET

ASH SURGE BASIN
POTENTIAL BREACH FLOWPATHS

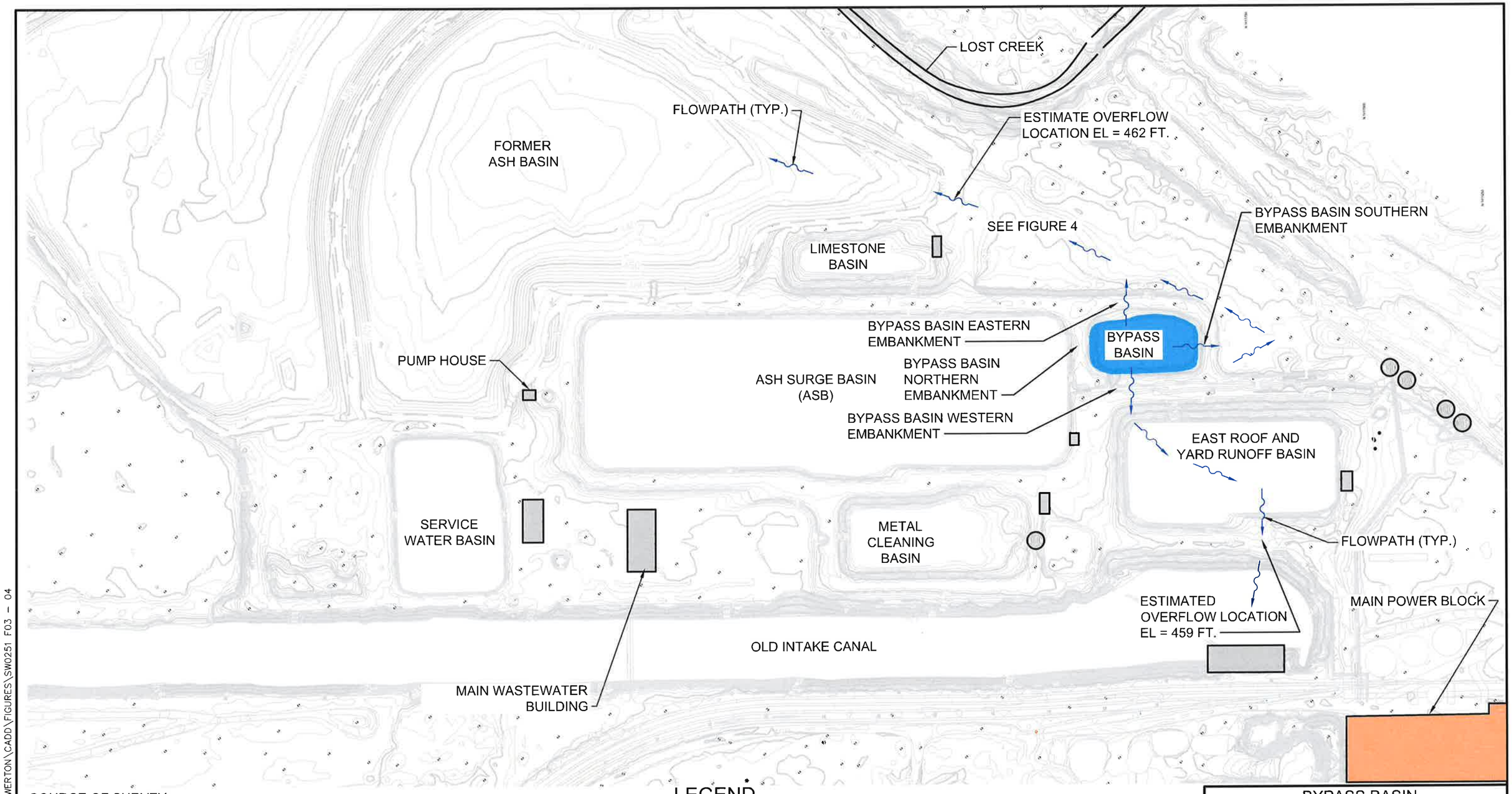
POWERTON STATION
PEKIN, ILLINOIS

Geosyntec consultants

PROJECT NO: SW0251 | OCTOBER 2016

FIGURE 3

\\SANDIEGO-01\SW0251\07 POWERTON\CADD\FIGURES\SW0251 F03 - 04



SOURCE OF SURVEY:

TOPOGRAPHY SOUTH OF SECONDARY ASH SETTLING BASIN AND FAB IS BASED ON AERIAL SURVEY PERFORMED BY AEROMETRIC, INC. DATED JUNE 19, 2008. TOPOGRAPHY NORTH OF ASH SURGE BASIN IS BASED ON SURVEY BY RIDGELINE CONSULTANTS PERFORMED IN FEBRUARY AND MARCH 2016.

NOTE:

1. TOPOGRAPHY SHOWN DOES NOT REFLECT MINOR REGRADING OF THE SLOPE EAST OF THE BYPASS BASIN PERFORMED IN FALL 2016.

LEGEND

STRUCTURES

OCCUPIED

UNOCCUPIED

N

0 200' 400'

SCALE IN FEET

BYPASS BASIN
POTENTIAL BREACH FLOWPATHS

POWERTON STATION
PEKIN, ILLINOIS

Geosyntec consultants

PROJECT NO: SW0251 | OCTOBER 2016

FIGURE 5

\\SANDIEGO-01\SW0251$\07 POWERTON\CADD\FIGURES\SW0251 F03 - 04