

January 28, 2022

**AECOM Project No.**  
60669161Jill Buckley  
Midwest Generation, LLC  
Will County Generating Station  
529 E. 135th Street  
Romeoville, IL 60446**Closure Alternatives Analysis for the East and West Ash Ponds at the Waukegan Generating Station in Waukegan, IL**

Dear Ms. Buckley,

This letter report presents the Closure Alternatives Analysis (CAA) for the East and West Ash Ponds (Basins) located at the Midwest Generation, LLC (MWG) Waukegan Station located west of Lake Michigan in Waukegan, Illinois. The CAA for this project involved developing ash basin closure strategies and evaluating these options relative to each other to determine a solution which is protective of the environment and addresses input from the community. After selection of the preferred alternative, a more detailed engineering and closure plan will be developed. The strategies discussed in the CAA are representative of the range of possible approaches for basin closure. The following sections of this letter report provide the project understanding, the considered closure options, approach used for the CAA, narratives addressing items listed in 35 IAC 845.710 regarding the different closure alternatives and ranking of closure options for each item.

**Project Understanding**

The MWG Waukegan Station is located adjacent to Lake Michigan in Waukegan, IL. The facility currently generates electricity through coal combustion as well as gas fired boilers. It is our understanding that coal fired generation is expected to cease at the facility in June of 2022. Under the 35 IAC 845 (Part 845) regulation, a number of submittals and permits are required for submission to the State of Illinois. As part of those submittals, a closure alternatives analysis, as presented in this letter report, of the East and West Ash Ponds is required. The East and West Ash Ponds are located south of the generating facilities at the station and are each approximately 11 acres in plan. Based on current Coal Combustion Residual (CCR) volumes present within each unit, we understand that the current plan for the facility is to close the West Pond by removal of all CCR and the basin will then be repurposed as a non-CCR low volume wastewater pond. The East Ash Pond will be closed by removal or closed in place based on the outcome of the CAA required under 35 IAC 845.710. AECOM further understands that neither the West nor East Ash Ponds exhibit Statistically Significant Levels (SSLs) of Appendix IV groundwater constituents which exceed Groundwater Protection Standards (GWPS).

## Closure Options

For the MWG Waukegan Station, AECOM considered the following closure options for the East Ash Basin (EAB) and West Ash Basin (WAB):

- Option 1: WAB Closure-by-Removal
- Option 2: WAB Closure-in-Place
- Option 3: EAB Closure-by-Removal
- Option 4: EAB Closure-in-Place Option 1
- Option 5: EAB Closure-in-Place Option 2
- Option 6: EAB Closure-in-Place Option 3

In general, the options being considered for each ash basin are Closure-by-Removal or Closure-in-Place. For the Closure-by-Removal options, the in-place CCR material will be excavated and transported to a commercial landfill. Based on conversations with state landfills, the closest facility able to accept the CCR material is located in Joliet, IL. The landfill in Zion, IL will not accept the CCR due to concerns related to the generation of hydrogen sulfide (H<sub>2</sub>S) which can cause odor and the Countryside Landfill in Grayslake, IL does not have capacity available to accept the volume of CCR which requires disposal. Currently, there is not an identified end user for beneficial reuse of the CCR material in the East Ash Basin and the material remaining in the West Ash Basin is not suitable for beneficial reuse. Also, MWG does not have an alternative offsite facility that can accept the existing CCR material and does not have enough space on site to accommodate the construction of a new CCR impoundment or landfill. After removal of all CCR material, the existing basin geomembrane liner would be decontaminated and reused for the non-CCR impoundment. For the West Ash Basin, MWG is considering reusing it as a stormwater and wastewater holding area. If this option is chosen, the basin would need to have a new geomembrane liner placed if the existing one is removed or not decontaminated.

For the Closure-in-Place options, the CCR material will be capped with a composite system consisting of either a geomembrane liner with cover soil or geomembrane liner with engineered turf. Drawings of the closure options for the East and West Ash Basins under consideration at the MWG Waukegan Station are provided as Attachment A. The grading plans and representative drawings included for Options 1 through 5 were developed by AECOM. The grading plan and representative drawings for Option 6 were developed by Sergeant & Lundy. After placement of the final cover system, placement of solar panels, native vegetation, or converting the surface to a park were considered for the long-term use of the closed CCR impoundment.

## Closure Alternatives Analysis (CAA) Approach

For the CAA approach, each Regulatory Comparison Criteria (item) presented in 35 IAC 845.710 was addressed for the different closure options. A narrative for each item is presented in the following section. In general, the narratives respond to each item when considering Closure-in-place or Closure-by-Removal for the West and East Ash Basins. After addressing each item identified in 35 IAC 845.710, a rank was given to each closure option. The ranking system gave each basin closure option a rank between 1 and 5, where 1 as the least desired and applicable and 5 as the most desired and applicable. The rankings for each item are presented on the spreadsheet included as Attachment D.

## 35 IAC 845.710 Comparison Criteria Narratives

### Long- and Short-term Effectiveness and Protectiveness of Closure Method [845.710(b)(1)]

#### 845.710(b)(1)(A)

##### *Magnitude of reduction of existing risks*

For CCR impoundments, the greatest risk to the surrounding environment is the release of material from structural or stability failure, or contaminant transport into the underlying groundwater system by infiltration through the base liner. For the Closure-by-Removal option, CCR material is removed from the site and the existing base liner system is removed or decontaminated. By removing the material and decontaminating the base liner, the contaminant source is removed, therefore the potential of environmental contamination by CCR is presumably eliminated. Also, for complete closure and removal of both basins, it is assumed that the interior and perimeter containment dikes will be removed, therefore the site would be graded with minimal surface relief and slope stability would not be an issue. For the instance where the closed basin is reused for stormwater or wastewater retention, the in-place decontaminated geomembrane liner would remain or be replaced. In regard to stability, the basin used for stormwater and wastewater retention would not change assuming similar loading conditions as when evaluated as a CCR impoundment.

For Closure-in-Place, the construction of an impervious barrier over the in-place CCR material would divert stormwater away from the impoundment, therefore decreasing the ability of contaminate transport by infiltration. The final cover would also be graded to divert stormwater away from the closed impoundment and eliminate the ability of water to pond on the cap. The cap system would be designed to be less permeable than the underlying liner system which would further reduce the infiltration of stormwater into the capped CCR. In addition, the existing groundwater monitoring plan would continue as part of the required 30-year post-closure plan. Regarding stability, the existing perimeter dikes would be evaluated against required minimum factors of safety presented in 35 IAC 845.460(a). It should be noted that global stability analyses for Closure-in-place were not performed as part of this CAA. It is assumed that the grades proposed for the final cover will not result in a factor of safety below the minimum required. Slopes of the proposed capping grades have been based on previous experience with other CCR closures. After the final closure plan is selected, a global stability analysis will be performed to evaluate factors of safety.

#### 845.710(b)(1)(B)

##### *Magnitude of residual risks in terms of likelihood of future releases of CCR.*

Residual risk of future release of CCR material is eliminated at the site for the Closure-by-Removal option. For the Closure-in-Place, release from perimeter dike failure is present, but the risk is greatly reduced by maintaining minimum grades of the final cover and addition of vegetation or engineered turf to prevent erosion. Final design of the closure will include a geotechnical stability analysis of proposed final grades to ensure factors of safety meet industry standards and regulatory requirements.

#### 845.710(b)(1)(C)

##### *Type and degree of long-term management required, including monitoring, operation, and maintenance.*

For Closure-by-Removal options where perimeter and interior dikes are removed, maintenance is limited to surface cosmetic repair as applicable. If perimeter dikes remain and the basin is used for stormwater and wastewater containment, annual inspections of perimeter dikes and base geomembrane of the basin interior would be implemented. For long-term maintenance, cleanout of drainage pipes, replacement of deteriorated drainage pipes, fixing potential erosion issues along exterior slopes, and compliance issues noted during the annual inspections would be addressed as needed.

For Closure-in-Place, long-term management of the closed CCR impoundment would include annual inspections of the cover and perimeter containment dike slopes for erosion and stability. If native grass is

used for the final cover, annual maintenance would include removal of woody vegetation or invasive species, revegetation, and repair of erosion or ponding of water.

#### *845.710(b)(1)(D)*

*Short-term risks that might be posed to the community or the environment during implementation of such a closure, including potential threats to human health and the environment associated with excavation, transportation, and re-disposal of contaminants.*

For Closure-by-Removal, removal of the CCR material will follow procedures presented in 35 IAC 845.740. During construction, the in-place CCR material will need to be transported from the site to a commercial landfill licensed to accept CCR and CCR impacted materials. During excavation and movement of material, there is an increased chance for CCR particulates entering the atmosphere, creating potential degradation to the local environment and worker respiratory health. To mitigate dispersion of particulates, CCR material will be sprayed with water to limit dust and be in a moist state during loading and transport. In addition, workers will wear appropriate personal protective equipment (PPE) for the task being completed. During transport of CCR material to the final receiving facility, potential for particulate release will be mitigated by covering the material with a tarp. Additionally, increased truck traffic will be present on the roadway in the surrounding communities during transport of material. This creates health risks to the public by an increase in air pollution from exhaust and exposure to particulates. This risk can be mitigated by utilizing truck routes that avoid communities and areas of normally high traffic. All material transported from the site will follow procedures presented in 35 IAC 845.740(c)(1).

For Closure-in-Place, capping of the CCR material will follow the procedures presented in 35 IAC 85.750. The proposed capping system for the final cover will consist of either a geocomposite with cover soil or a structured geomembrane with engineered turf protection. The final cover will be constructed to minimize or eliminate infiltration of liquids into the CCR material and be graded to promote surface drainage and avoid ponding. Since the CCR material will remain in-place, risk to environment and public health during transport of CCR material is eliminated. Health risks are limited to the workers performing construction operations during the closure process. To mitigate risk from exposure to particulates during movement of material, dust control efforts using water will be implemented. In addition, workers will wear appropriate PPE for the task being completed. After placement of the final cover, the interface between the CCR material and the atmosphere is removed, therefore release of CCR particulates to the atmosphere is eliminated.

For long-term final closure, addition of solar panels provides an alternative energy source at the facility. Health and environmental impacts to the local community are limited. Native vegetation added to the final cover reduces erosion of cover material and adds carbon sink to the landscape. If engineered turf is used as an alternative to native vegetation, potential for sediment transport from the cover to nearby waterways from stormwater flow is nearly eliminated. For the park after closure option, increase risk to public health includes interaction with nearby industrial facilities, resulting in exposure to air pollution and heavy equipment traffic.

#### *845.710(b)(1)(E)*

*Time until closure and post-closure care or the completion of groundwater monitoring pursuant to Section 845.740(b) is completed.*

For Closure-by-Removal, the following groundwater monitoring program will be implemented:

- Groundwater monitoring for three (3) years after completion of closure or for three years after groundwater monitoring does not show exceedance established under 35 IAC 845.600.

For Closure-in-Place, the following groundwater monitoring program will be implemented:

- Continuation of groundwater monitoring plan as outlined in 35 IAC 845.650 as part of the 30-year-post-closure care period.

## *845.710(b)(1)(F)*

*Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, containment, or changes in groundwater flow.*

For Closure-by-Removal, CCR material will be removed, and the existing basin geomembrane liner will be decontaminated or replaced, therefore the source for CCR contamination has been removed. Regarding groundwater flow, infiltration of stormwater may affect flow paths if a geomembrane liner is no longer present. For the option where the ash basin is repurposed as a stormwater and wastewater containment basin, the geomembrane liner that would be installed would create an impervious layer, therefore groundwater flow would not be connected to the basin.

For Closure-in-Place, the CCR material will be covered with an impervious geomembrane liner and contained within the existing perimeter dikes. With the CCR material capped and contained, exposure after closure to the environment would only occur if the material were to be removed at a later date or in the unlikely event that a failure of the cap or perimeter dikes were to occur. With the addition of an impervious cap, groundwater flow may be affected due to infiltration from runoff. During current operations, rainwater is collected in the Ash Basin. With the placement of the cap, rainwater that was previously collected by the basin would now be diverted to nearby surfaces and infiltrate naturally or will be diverted into the stormwater collection system for the facility.

## *845.710(b)(1)(G)*

*Long-term reliability of the engineering and institutional controls, including an analysis of any off-site, nearby destabilizing activities.*

For Closure-by-Removal, the in-place CCR material and basin base liner will be removed, decontaminated, or replaced, therefore no source of contamination will remain on site. Site groundwater will be monitored for three (3) years after completion of closure or until groundwater monitoring does not show exceedances as established under 35 IAC 845.600.

For Closure-in-Place, the following engineering and institutional controls will be implemented:

- Final cover will be designed to minimize infiltration and erosion as presented in 35 IAC 845.750(c)
- Final cover will be constructed in accordance with the procedures presented in 35 IAC 845.750.
- Final cover grades will consider potential settlement to maintain stable slopes.
- The geomembrane and soils used for the final cover system will be tested to verify conformance to the material properties presented in 35 IAC 845.750.
- During construction of the final cover, construction oversight will be performed by a third party for documentation and quality control purposes.
- After construction, the final cover will be inspected annually for erosion, grade reversals, and slope displacement. Any discrepancies will be brought to attention to the owner and the respective repairs will be completed as soon as possible.
- Groundwater monitoring will continue as part of the 30-year-post-closure care period.

For both closure types, no apparent destabilizing activities adjacent to the East and West Ash Basin footprints are made apparent. If destabilizing activities become apparent during the design, construction, and/or post closure phases, the destabilizing activity, and its effects on the closed CCR impoundment will be addressed accordingly to maintain stability and the regulatory requirements imposed at the time this CAA was performed.

## 845.710(b)(1)(H)

### *Potential need for future corrective action of the closure alternative.*

For Closure-by-Removal, the CCR material and existing base liner will be removed, eliminating the source for CCR contamination. If the former ash basin is to be reused as a stormwater and wastewater containment basin, the existing geomembrane liner will be decontaminated or replaced. If the basin is repurposed for stormwater and wastewater containment, annual inspections of the geomembrane liner, water conveyance structures, and containment slopes will be performed. Possible future corrective post Closure-by-Removal actions include geomembrane liner replacement, maintenance of divider dike slopes, and maintenance of stormwater and wastewater structures.

For Closure-in-Place, the CCR material will remain in-place and a final cover will be constructed to prevent infiltration of rainwater into the CCR material. Additionally, the final cover will be sloped to promote drainage away from covered material and avoid ponding of water on the cap. After construction, groundwater monitoring will be performed as part of the 30-year-post-closure plan. Annual inspections of the final cover and perimeter dike slopes for erosion and ponding will be completed. Possible future corrective actions include maintenance of the final cap slopes. In the event that groundwater contamination is detected, remedial actions, such as construction of bentonite barrier trenches or removal of material, will be completed as needed.

After construction of the final cover system, potential use options for the covered CCR impoundment space include installation of solar panels, native vegetation, or public park. Future corrective actions for solar panels include maintenance and replacement of solar structures as needed and infilling of cap ponding areas due to induced CCR settlement by additional cover loading. For the native vegetation, future corrective actions would likely only pertain to erosion or ponding on the final cover. For the public park, maintenance and replacement of structures and aesthetics would be future corrective actions to consider.

## Controlling Future Releases [845.710(b)(2)]

### 845.710(b)(2)(A)

#### *Extent to which containment practices will reduce further releases.*

For Closure-by-Removal, the CCR material will be removed, and the basin base liner will be removed, decontaminated, or replaced, therefore the potential for future CCR release is eliminated.

For Closure-in-Place, the CCR material will remain on-site, but will be capped with an impervious final cover system. To reduce further release, the following will be implemented as part of the Closure-in-Place options:

- Slope stability analyses will be performed or revisited to identify if the proposed final cover system and perimeter dike slopes meet minimum required factors of safety as presented in 35 IAC 845.460(a).
- Final grades of the cover system will be constructed to account for settlement and maintain slopes that meet required minimum factors of safety presented in 35 IAC 845.460(a).
- After placement of the final cover system, a topsoil layer will be added with vegetation to decrease erosional affects.
- Any erosion to the cap or perimeter dikes identified during the annual inspections will be addressed accordingly.

## *845.710(b)(2)(B)*

### *Extent to which treatment technologies may be used.*

For Closure-by-Removal, the CCR material will be removed, and the basin liner system will be removed, decontaminated, or replaced with a new geomembrane. Since the CCR material is being removed from the site, no treatment technologies are anticipated.

For Closure-in-Place, the final cover system will create an impervious barrier between the impounded CCR material and the atmosphere. Additionally, the impervious barrier will prevent infiltration into the in-place CCR material, alleviating the potential for contaminant transfer to the underlying groundwater system. Further, before installation of the final cover, the CCR material will be dewatered and prepared for capping in accordance with the procedures presented in 35 IAC 845.750(b). Since the CCR material will be free of liquids and covered with an impervious barrier, no additional treatment technologies are anticipated.

## Implementation of Potential Closure Method [845.710(b)(3)]

### *845.710(b)(3)(A)*

#### *Degree of difficulty associated with constructing the technology.*

For Closure-by-Removal, anticipated construction challenges include dewatering, transport of CCR material, and avoiding puncture of existing geomembrane if it is to be decontaminated and reused for stormwater and wastewater containment. For dewatering of CCR material, contaminated water will need to be pumped from the basin in a manner that avoids environmental release and protects health of workers. Challenges regarding transport of material will be dependent on available routes and distance to the nearest certified disposal facility. If the geomembrane liner is punctured, repairs by a certified installer will be completed. If the geomembrane liner is replaced, the new liner will be installed by a certified installer. Of the mentioned challenges associated with Closure-by-Removal, the degree of difficulty is moderate to moderately hard.

For Closure-in-Place, anticipated construction challenges include dewatering CCR material, final grading, geosynthetic liner installation, and placement of final cover soils. For dewatering of CCR material, contaminated water will need to be pumped from the basin in a manner that avoids environmental release and protects health of workers. For final grading, fill material will need to be placed over the in-place CCR material prior to final capping. MWG has an available stockpile of sand material at the station which will be used for capping the CCR material in place and achieving the final closure grades for the site. For the final cover installation, the geomembrane liner will need to be installed by a certified installer and will depend on site weather conditions during construction. Of the mentioned challenges associated with Closure-in-Place, the degree of difficulty is moderate.

### *845.710(b)(3)(B)*

#### *Expected operational reliability of the technologies.*

For Closure-by-Removal, CCR material and base liner system will be removed from site. If the basin is reused as a stormwater and wastewater containment basin, the existing geomembrane liner will be decontaminated or replaced. Regarding reliability, geomembranes exposed to ultraviolet radiation from direct sunlight have anticipated minimum life expectancy of 30 years. The longevity increases dramatically if ultraviolet radiation from direct sunlight is avoided by covering with layer of soil or other material. Additionally, conformance testing will be performed on geomembrane used for the basin liner to ensure required material specifications are met. Implementation of an annual inspection of the geomembrane liner and perimeter containment dike slopes will identify potential issues that can be addressed accordingly.

For Closure-in-Place, the CCR material will be dewatered and capped with an impervious final cover system. The impervious final cover system will be a composite system consisting of a geomembrane liner

and final cover soil layer. Prior to installation, the geomembrane liner will be tested for conformance to required material specifications and the properties required by 35 IAC 845.750(c)(1)(B). During geomembrane liner installation, oversight for quality control will be performed to confirm installation is completed in accordance with applicable standards. Since the geomembrane liner will be covered with soil or alternative barrier system, longevity is anticipated to be a minimum of 400 years.

### *845.710(b)(3)(C)*

*Need to coordinate with and obtain necessary approvals and permits from other agencies.*

The following approvals and permits are anticipated for each closure option:

---40 CFR---

- Written Closure Plan [257.102(b)]
- Amendments to written closure plan, as applicable [257.102(b)(3)].
- Owner or operator must prepare a notification of intent to close CCR unit [257.102(g)].
- Within 30 days of completion of closure of the CCR unit, owner or operator must prepare a notification of closure the CCR unit [257.102(h)].
- Following closure, owner or operator must update deed notifications [257.102(i)]

---35 IAC---

- Public notice and participation [845.260(a)]
- Agency issued construction permit needed prior to work [845.200(a)(4)]
- Operating permit must be maintained until the completion of the post-closure care when the CCR surface impoundment is closed with a final cover system [845.200(a)(5)(A)].
- Operating permit must be maintained until completion of groundwater monitoring under 35 IAC 845.740(b) when CCR surface impoundment is closed by removal [845.200(a)(5)(B)].

In addition to the above permits associated with the State and Federal CCR rules, a National Pollutant Discharge Elimination System (NPDES) Construction General Permit for stormwater management will also likely be required for the project. Modifications may also be necessary to the Site's NPDES Operating Permit.

### *845.710(b)(3)(D)*

*Availability of necessary equipment and specialists.*

For Closure-by-Removal, the following contractors and equipment will be applicable:

- Earthwork contractor using excavators, dozers, and other applicable earth moving equipment.
- Equipment for dewatering CCR material prior to removal.
- Certified hauler for transporting CCRs and other materials to appropriate accepting facility. Material will be transported using dump trucks and/or tractor-trailers.
- If existing geomembrane liner remains in-place, decontamination contractor will be needed. If existing geomembrane liner is replaced, certified geomembrane liner installation contractor will be needed.
- Certified geosynthetic laboratory to perform material testing for conformance of the geomembrane liner.
- Construction oversight for documentation and quality control.



- Certifying engineer to ensure closure process was completed according to applicable specifications and regulations.

For Closure-in-Place, the following contractors and equipment will be applicable:

- Earthwork contractor using excavators, dozers, rollers, and other applicable earth moving equipment for grading of material.
- Equipment for dewatering CCR material prior to final grading and final cover system placement.
- Certified geomembrane liner installation contractor.
- Certified geosynthetic and soil laboratories for conformance testing.
- Construction oversight for documentation and quality control of grading material placement and compaction, installation of the geomembrane liner, and placement of final cover soils.
- Certifying engineer to ensure closure process was completed according to applicable specifications and regulations.

### *845.710(b)(3)(E)*

*Available capacity and location of needed treatment, storage, and disposal services.*

For Closure-by-Removal, no other locations on site are available for consolidation or disposal. After dewatering of CCR material is completed, the materials will be transported to a certified commercial landfill facility. Handling and transport of the CCR and CCR contaminated materials will be performed following the procedures presented in 35 IAC 845.740(c).

For Closure-in-Place, the CCR material will remain at the facility, be dewatered, and capped with an impervious final cover system, therefore transport for beneficial reuse or disposal is not needed.

### *Local Community Impacts [845.710(b)(4)]*

#### *845.710(b)(4)*

*The degree to which the concerns of the residents living within communities where the CCR will be handled, transported, and disposed are addressed by the closure method.*

For Closure-by-Removal, local communities will be affected by increased traffic and possible exposure to CCR particulates during transport of material. Mitigation efforts previously discussed include creating transport routes that avoid local community centers, and fugitive dust mitigation measures that include covering material during transport with a tarp.

For Closure-in-Place, transport of the CCR and CCR impacted materials is eliminated, therefore direct exposure to CCRs is limited to the local community near the Waukegan Station. During construction, there is potential of CCR material being released into the atmosphere and traveling to nearby residential areas by wind. To mitigate potential release, fugitive dust control measures, such as wetting, will be implemented during construction.

## Additional Considerations – Transportation and Disposal [845.710(c)]

The following subsections address items the owner or operator of the CCR surface impoundment must consider in the CAA as presented in 35 IAC 845.710(c).

### *845.710(c)(1)*

*Analyze complete removal of the CCR as one closure alternative, along with the modes for transporting the removed CCR, including by rail, barge, low-polluting trucks, or a combination of these transportation modes.*

For transport of CCR and CCR contaminated material, the preferred method is by truck. For Closure-by-Removal, the CCR and CCR contaminated material would be excavated and placed onto dump trucks and/or tractor-trailers for transport to the nearest commercial landfill facility. Based on conversations with state landfills, the closest facility that can accept the CCR material from the site is located in Joliet, IL which is approximately 80 miles from the site. Two landfills originally considered in the CCA were Zion Landfill (Zion, IL) and Countryside Landfill (Grayslake, IL). After discussions with the landfill owners, Zion Landfill will not accept CCR material and Countryside Landfill cannot accept the volumes anticipated for the closure. Alternative transport methods considered include heavy rail or barge. Transportation by rail or barge have not historically been used for managing CCR material at the MWG Waukegan Station and would require the design, permitting and construction of new infrastructure. The MWG Waukegan Station has rail spurs from the main railroad line, but the current system was designed to transfer coal in one direction, from railcar to generating station. To efficiently move CCR from the impoundment and load into a rail car, a conveyor system would need to be installed and permitted. Similar to rail, transport of CCR by barge would require new infrastructure to be installed and the addition of extensive environmental permitting, such as NPDES, stormwater, air construction permits, and permits from the Illinois Department of Natural Resources (IDNR) and United States Army Corp. of Engineers (USACE), would be needed. Due to additional construction and permitting, rail and barge transport of the material are not viable options at the site. Instead, based on the site's proximity to a CCR and CCR contaminated materials accepting facility, transport by truck is the preferred method.

### *845.710(c)(2)*

*Identify whether the facility has an onsite landfill with remaining capacity that can legally accept CCR, and, if not, whether constructing an onsite landfill is possible.*

The MWG Waukegan Station currently does not have an on-site landfill that can legally accept CCR materials. Also, limited space and timing inhibits possible construction of a CCR landfill meeting legal requirements.

### *845.710(c)(3)*

*Include any other closure method in the alternatives analysis if requested by the Agency.*

No additional alternative analysis requests by the Agency were provided at the time this letter report was written.

## Additional Considerations – Cost Estimate, Groundwater, and Surface Waters [845.710(d)]

The following subsections address items the owner or operator of the CCR surface impoundment must consider in the CAA as presented in 35 IAC 845.710(d).

### *845.710(d)(1)*

*Meet or exceed a class 4 estimate under the AACE Classification Standard, incorporated by reference in Section 845.150, or a comparable classification practice as provided in the AACE Classification Standard.*

For the CAA, an Association for the Advancement of Cost Engineering (AACE) Class 4 estimate for each closure option was completed. Per AACE, a Class 4 estimate is typically used for a feasibility study with

level of project definition at 1 to 15 percent. Costs for each closure option using Class 4 level estimate criteria and the considerations outlined in this letter report are presented in Table 1. A breakdown of the costs for each option are included as Attachment B. Please note that the estimated costs for Closure-in-Place Options 2, 4, and 5 consider a final cover constructed with soils over the geomembrane and Option 6 considers a final cover consisting of a geomembrane liner with engineered turf. Rates presented in the cost estimate are based on historical information, experience from similar type projects, and engineering judgement.

**Table 1. Summary of Current Estimates (AACE Class 4)**

Option	Closure Option	Estimated Total Closure Cost (2021 US Dollars)	Estimated Total Post-Closure Cost <sup>(1)</sup> (2021 US Dollars)	Estimated Total Cost (2021 US Dollars)
1	West Ash Basin – Closure-by-Removal	\$15,983,824	\$206,250	\$16,190,074
2	West Ash Basin – Closure-in-Place, final cover with soils	\$13,229,065	\$3,196,875	\$16,425,940
3	East Ash Basin – Closure-by-Removal	\$16,002,765	\$206,250	\$16,209,015
4	East Ash Basin – Closure-in-Place (Option 1), (final cover with soils)	\$13,120,943	\$3,196,875	\$16,317,818
5	East Ash Basin – Closure-in-Place (Option 2), final cover with soils	\$16,459,417	\$3,196,875	\$19,656,292
6	East Ash Basin – Closure-in-Place (Option 3), final cover with engineered turf	\$16,300,238	\$3,196,875	\$19,497,133

Note:

1. Post-closure cost for “Closure by Removal” assumes 3-year post-closure-plan and “Closure in Place” assumes 30-year-post-closure plan.

**845.710(d)(2)**

*Contain the results of groundwater contaminant transport modeling and calculations showing how the closure alternative will achieve compliance with the applicable groundwater protection standards.*

A groundwater model depicting potential flow based on surface changes for each closure option was completed. The groundwater model was developed by KPRG and Associates, Inc. (KPRG) and BAS Groundwater Consulting (BAS). A groundwater modeling report is provided under separate cover. For reference, the cover page of the groundwater modeling report is included as Attachment C.

**845.710(d)(3)**

*Include a description of the fate and transport of contaminants with the closure alternative over time, including consideration of seasonal variations.*

The groundwater modeling report by KPRG and BAS discusses contaminant transport based on the groundwater models developed for the site. The groundwater modeling report is provided under separate cover. For reference, the cover page of the groundwater modeling report is included as Attachment C.

**845.710(d)(4)**

*Assess impacts to waters in State*

Based on available aerial images of the site, the East and West Ash Basins are situated adjacent to a possible wetland. Additionally, the Lake Michigan shoreline is located approximately 690 to 850 feet east and downslope of the East and West Ash Basin footprint.

For Closure-by-Removal, CCR material will be removed, and the base liner removed, decontaminated, or replaced, therefore no source for CCR contamination would be present.

For Closure-in-Place, the CCR material will be capped with an impervious final cover system, therefore runoff from storm events would not encounter CCR material. CCR material would be dewatered, and the cap would prevent infiltration from rain events, therefore connection between the CCR material and the underlying groundwater system would be limited. Additionally, with a groundwater monitoring plan being implemented as part of the 30-year-post-closure plan, CCR contaminants would be detected, and the appropriate remediation measure could be implemented.

## **Discussion**

Two public meetings for the Waukegan Generating Station's East and West Ash Basins were held on December 15 and 16, 2021. During the public meetings, MWG presented the preferred option of Closure-in-Place for the East Ash Basin and Closure-by-Removal for the West Ash Basin. Closure-in-Place for the East Ash Basin would include a final cover system utilizing engineered turf (ClosureTurf®). A document recording the issues and questions raised during the public meetings was provided upon request and posted for public view by MWG. The following paragraphs provide summaries of the issues and questions discussed during the public meetings.

During the public meetings, questions were raised regarding the current condition of the East and West Ash Basin base liners. Based on current federal and state CCR regulations, the East and West Ash Basin base liners do not meet federal or state CCR regulations of having a minimum 2-feet of compacted clay below the geomembrane. The purpose of the 2-foot clay layer is to serve as a redundant unit in case the overlying geomembrane leaks. Based on current groundwater monitoring of the site, no indication of a leaking geomembrane liner is apparent. Additionally, with the placement of an Illinois EPA approved geomembrane final cover system, infiltration of rainwater into the CCR material will be minimized and runoff will be diverted away from the closed ash basin.

In regard to groundwater, many questions were raised concerning the groundwater monitoring well network and groundwater flow model. An existing groundwater monitoring well network for the East and West Ash Basins consisting of three (3) upgradient (i.e., background) wells and five (5) downgradient wells has been in use since 2015. MWG has been using the existing network to specifically monitor for releases of coal ash constituents under the federal CCR rules. Based on consistency of the data from the downgradient monitoring wells that indicate little spatial variability in the results, the existing network is sufficient to monitor groundwater interacting with the East and West Ash Basins. As part of the approval process, MWG submitted the groundwater monitoring network to the Illinois EPA as part of its Illinois CCR Rule operating permit application on November 1, 2021. In addition to the existing groundwater monitoring well network, a groundwater model was created to estimate transport of potential constituents.

The results from the groundwater model show that for the closure options considered, all are equally protective of groundwater. Results from the groundwater modeling are provided in the report as Attachment C. A full groundwater modeling report will be submitted with the construction permit application submitted to the Illinois EPA (February 1, 2022). The permit application will also be posted to MWG's website within 14 days of the permit submittal.

In addition to groundwater, questions regarding drinking water quality were also asked during the public meetings. MWG's analysis of groundwater on the eastern edge of the property indicates that there is little risk to Lake Michigan by the CCR surface impoundments, since concentrations of constituents are below Lake Michigan surface water standards. Both Illinois EPA and the City of Waukegan have concluded that the Lake Michigan water is suitable for drinking water. The Illinois EPA stated in its 2021 Integrated Water Quality Report that Lake Michigan "fully supports" the drinking water use. The City of Waukegan also reported in 2021 that its drinking water, which draws from Lake Michigan, complies with all standards. The City further states that there is "low susceptibility to shoreline contaminants due to mixing and dilution" because the water supply intake is 6,200 feet into the lake.

For the Closure-in-Place with ClosureTurf® alternative, questions regarding reliability, support for natural vegetation, impacts to local wildlife, and predictive leakage rate of material were raised. ClosureTurf® is an engineered cap system designed by Watershed Geo that consists of a structured geomembrane below synthetic turf with sand infill. The ClosureTurf® system is used as an alternative to topsoil and natural vegetation. The artificial turf component has been tested at hurricane-level wind speeds and at storm rainfall intensities of over 6 inches per hour, providing more robust protection when compared to topsoil and native vegetation. Historically, ClosureTurf® has been installed at more than 80 locations within the United States. Based on ongoing research, the structured geomembrane and artificial turf components of the proposed ClosureTurf® cap are anticipated to last over 400 and 100 years, respectively. Additionally, the materials used for ClosureTurf® are free of per- and polyfluoroalkyl substances (PFAS). In regard to wildlife, the sand infill placed on the artificial turf is approximately ½ to ¾ inch thick, therefore risk of burrowing animals being trapped or killed is minimal. A monitoring program will also be implemented to ensure integrity of the ClosureTurf® system and that it is not compromised by local wildlife activities. Any discrepancies or damage to the cover system noted during annual monitoring will be addressed accordingly.

The estimated liquid flow rate through the structured geomembrane component of the ClosureTurf® system for the East Ash Basin is  $6.3 \times 10^{-10}$  m<sup>3</sup>/sec/m<sup>2</sup>. For inquiries regarding the liquid flow rate calculation, please refer to Section 3.2 of the Preliminary Written Closure Plan for the East Ash Basin on MWG's Illinois CCR Rule compliance website. It is important to note that the estimated liquid flow rate is based on the following assumptions: 1) a 2-mm-diameter hole is present for every acre of liner placed, and 2) 4.37 inches of rainwater is present on the liner. The first assumption is based on research completed by others that indicated geomembrane liners with construction quality assurance programs implemented during installation are not expected to have more than one unaddressed defect per acre. The second assumption is based on a 25-year, 24-hour precipitation event for Lake County, Illinois and is considered conservative since the final cover system will be designed to provide positive drainage to prevent accumulation of ponding water on the structured geomembrane.

During the public meeting, questions were asked regarding shoreline erosion and how the East Ash Basin's final cover system may be impacted by loss of land between it and Lake Michigan. The concern for loss of shoreline was related to a study that estimated Illinois Beach State Park has lost 27 to 62 feet of shoreline between 2010 and 2012. The study was referenced in a *Chicago Tribune* article on May 30, 2017 titled "Lake Michigan Shoreline Erosion Could be Getting Worse, Research Shows." Within the article, it is stated that the northern portion of Illinois Beach State Park has retreated more than 600 feet between 1939 and 2014. Alternatively, it is also stated that the breakwater at Waukegan Harbor has extended into the lake, growing at a rate of 11 feet each year. The Waukegan Generating Station is located approximately 1.5 miles north of Waukegan Harbor and 4.5 miles south of the Illinois Beach State Park Northern Unit. Accordingly, the conditions at the Waukegan Generating Station are similar to those at Waukegan Harbor, as evidence by the regular dredging of sand that accumulates in the Station's Intake Channel.

A September 2020 study conducted by the Illinois Department of Natural Resources (IDNR) Coastal Management Program (CMP) and the Illinois State Geological Survey (ISGS) through the Prairie Research Institute indicated that the shoreline along the Illinois Beach State Park's North Unit has retreated by as much as 820 feet between 1939 and 2017. In the same study, it was concluded that the shoreline along Illinois Beach State Park's South Unit had advanced lakeward by as much as 1,100 feet during the same time period. Additionally, a USACE Chicago District's environmental assessment published in September 2019 for the ongoing Waukegan Harbor Dredging project indicated that shoreline gain along the southern part of Illinois Beach State Park is occurring at a rate "at or near what likely occurred in the natural setting." Based on the 2017 *Chicago Tribune* article, the 2019 USACE environmental assessment for the Waukegan Harbor Dredging project, and the 2020 IDNR CMP and ISGS study, it is anticipated that the shoreline located near the East Ash Basin is more likely to advance lakeward than to lose land via erosion. As part of MWG's anticipated regular inspections of the East Ash Basin final cover system during its post-closure care program, MWG will monitor the Lake Michigan shoreline east of the East Ash Basin to determine if any shoreline losses are occurring, and if so, whether

the loses would have a negative impact on the East Ash Basin final cover system. If negative impacts are anticipated, the appropriate remediation measures will be taken.

Questions regarding financial assurance and closure costs were asked during the public meetings. Owners of CCR surface impoundments are required to provide financial assurance to ensure completion of closure and post-closure activities, as applicable. MWG has provided such financial assurance in the form of performance bonds to the Illinois EPA. Costs regarding which closure option would be priority were not considered a determinative factor by MWG in the CAA.

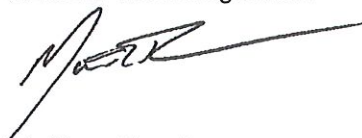
Questions were raised during the public meetings regarding the proposed closure methods for the two impoundments. Questions were posed as to if closure by removal would be more protective of the environment than the proposed preferred methods of closure by removal and repurposing of the West Ash Basin and Closure in Place of the East Ash Basin. The analyses which have been performed indicate that closure in place of the East Ash Basin is equally protective to groundwater as closure by removal. Capping the East Ash Basin and removing the free water from within the ash basin will minimize infiltration of water into the CCR and will minimize infiltration into the underlying ground which could impact groundwater. Planned inspection and maintenance of the closed basin will address concerns related to the potential for erosion and loss of shoreline adjacent to it. Studies also indicate that long term loss of shoreline adjacent to the impoundments is unlikely. The proposed preferred closure methods are protective of the environment, meet the requirements of the state and federal regulations and limit offsite hauling of CCR from the East Ash Basin.

## Closing

We appreciate this opportunity to be of services to you. If there are any questions regarding the information contained in this letter report, or if we may be of further assistance, please feel free to contact us.

Yours sincerely,

AECOM Technologies Inc.



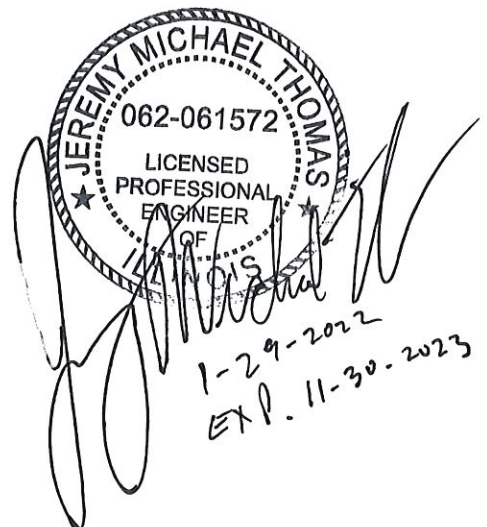
Matthew Bloecher  
Geotechnical Engineer  
[matthew.bloecher@aecom.com](mailto:matthew.bloecher@aecom.com)



Jeremy Thomas, P.E. (IL)  
Associate  
[jeremy.thomas@aecom.com](mailto:jeremy.thomas@aecom.com)

## Attachments

- A – Closure Alternatives Analysis Drawings (not for construction)
- B – CCR Impoundment Estimates for Waukegan Station
- C – Numerical Groundwater Flow Model Report Cover (for reference)
- D – Alternatives Ranking Matrix



**ATTACHMENT A**

# MIDWEST GENERATION, LLC

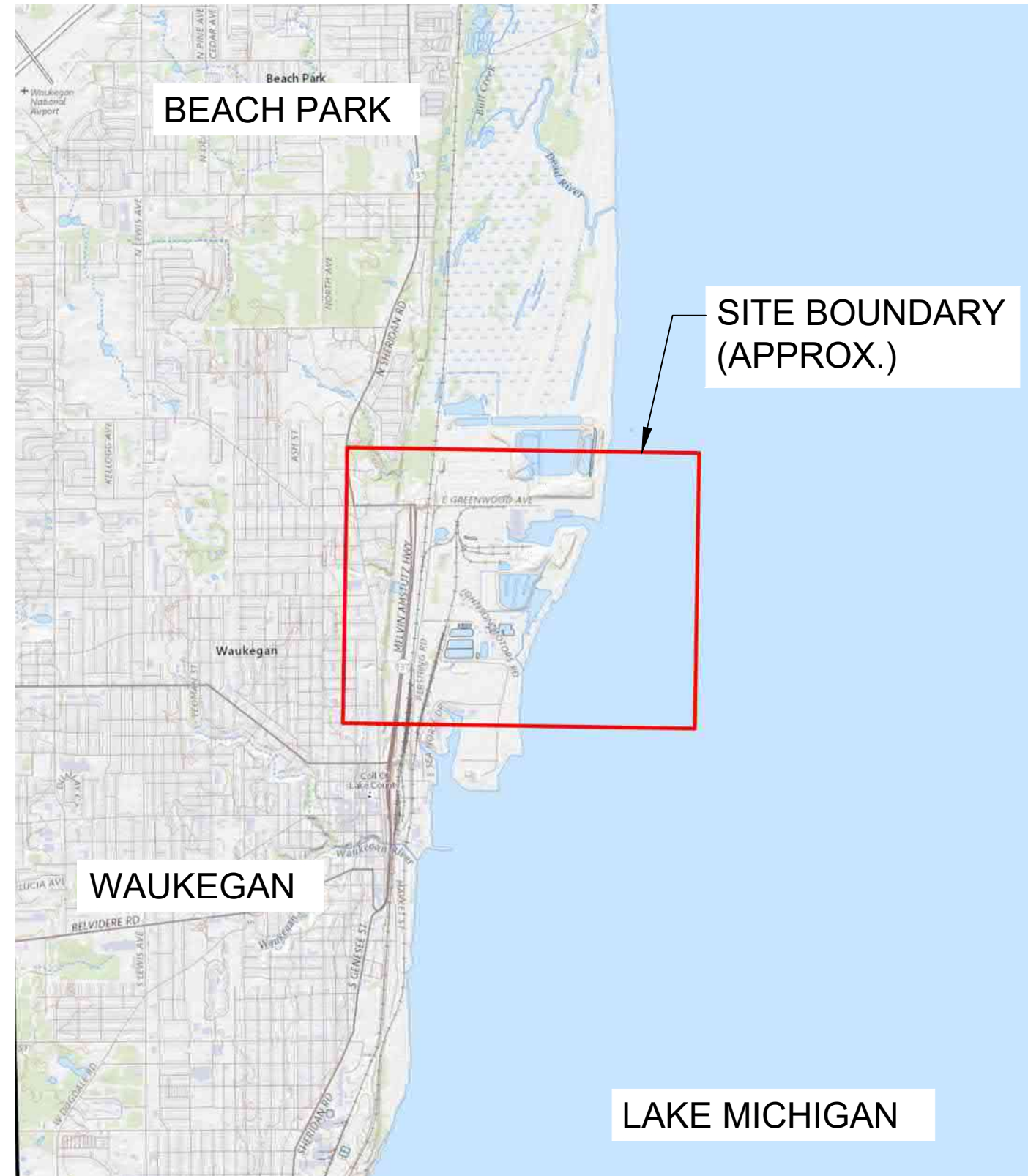
# WAUKEGAN GENERATING STATION

## CLOSURE ALTERNATIVES ANALYSIS DRAWINGS

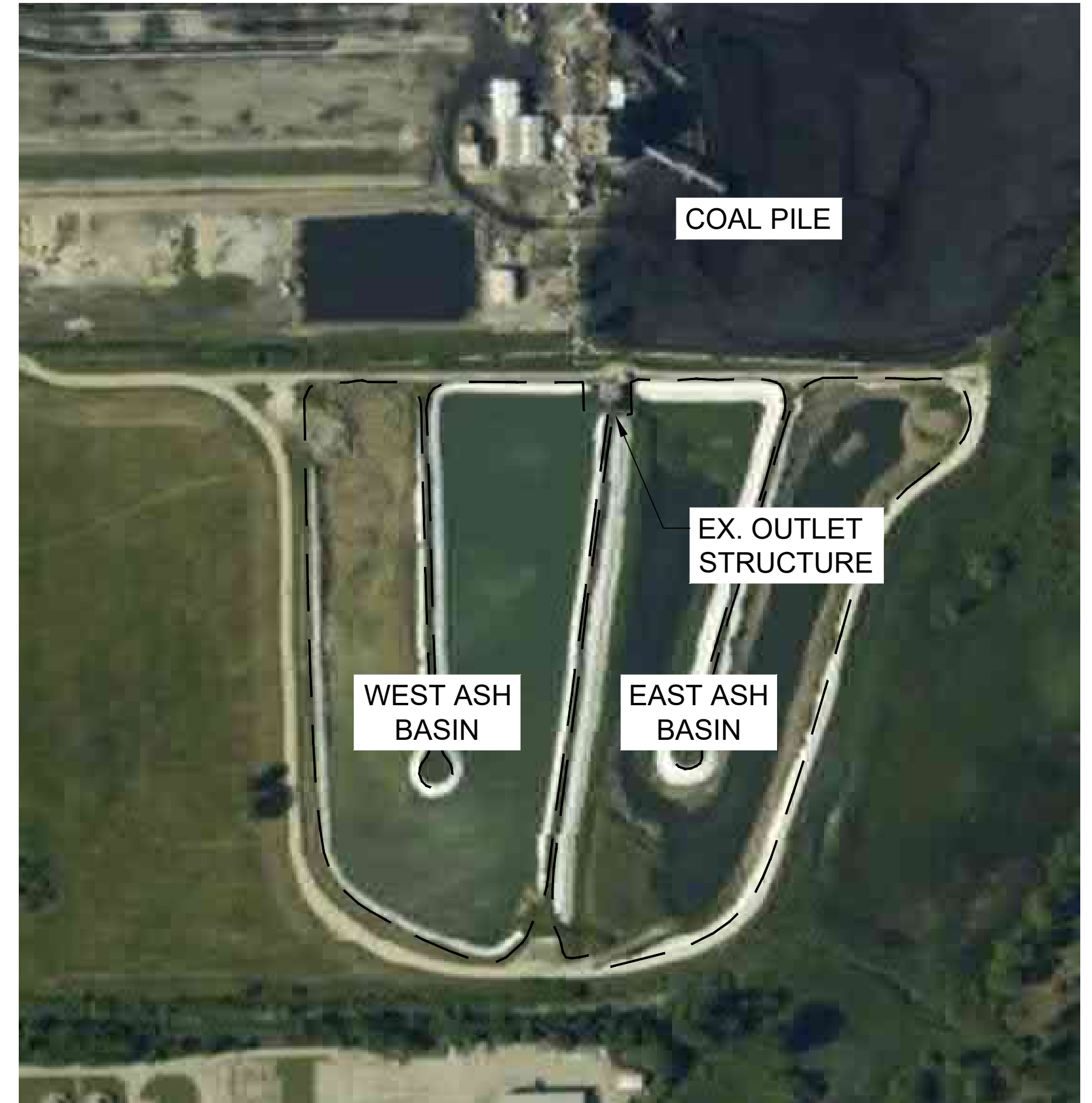
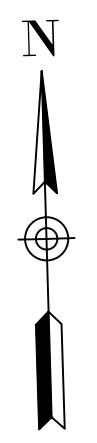
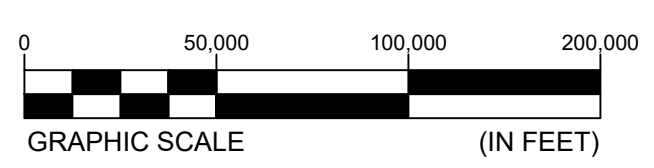
### WAUKEGAN, ILLINOIS

ISSUED FOR REVIEW

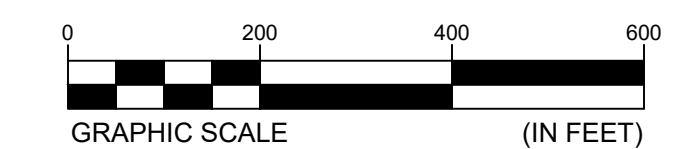
NOVEMBER 15, 2021



**SITE LOCATION MAP**



**SITE OVERVIEW MAP**



NOT FOR CONSTRUCTION

DRAWING LIST	
DRAWING NO.	DRAWING TITLE
01	TITLE SHEET
02	ESTIMATED BOTTOM OF ASH GRADES
03	EXISTING CONDITIONS PLAN
04	WEST ASH BASIN - CLOSURE BY REMOVAL
05	WEST ASH BASIN - CLOSURE IN PLACE
06	EAST ASH BASIN - CLOSURE BY REMOVAL
07	EAST ASH BASIN - CLOSURE IN PLACE (OPTION 1)
08	EAST ASH BASIN - CLOSURE IN PLACE (OPTION 2)
09	CROSS SECTIONS - WEST ASH BASIN - CLOSURE BY REMOVAL
10	CROSS SECTIONS - WEST ASH BASIN - CLOSURE IN PLACE
11	CROSS SECTIONS - EAST ASH BASIN - CLOSURE BY REMOVAL
12	CROSS SECTIONS - EAST ASH BASIN - CLOSURE IN PLACE (OPTION 1)
13	CROSS SECTIONS - EAST ASH BASIN - CLOSURE IN PLACE (OPTION 2)
14	DETAILS

FOR EAST ASH BASIN - CLOSURE IN PLACE (OPTION #3) REFER TO SARGENT AND LUNDY DRAWINGS WKG-AP-CSK-008 AND WKG-AP-CSK-009

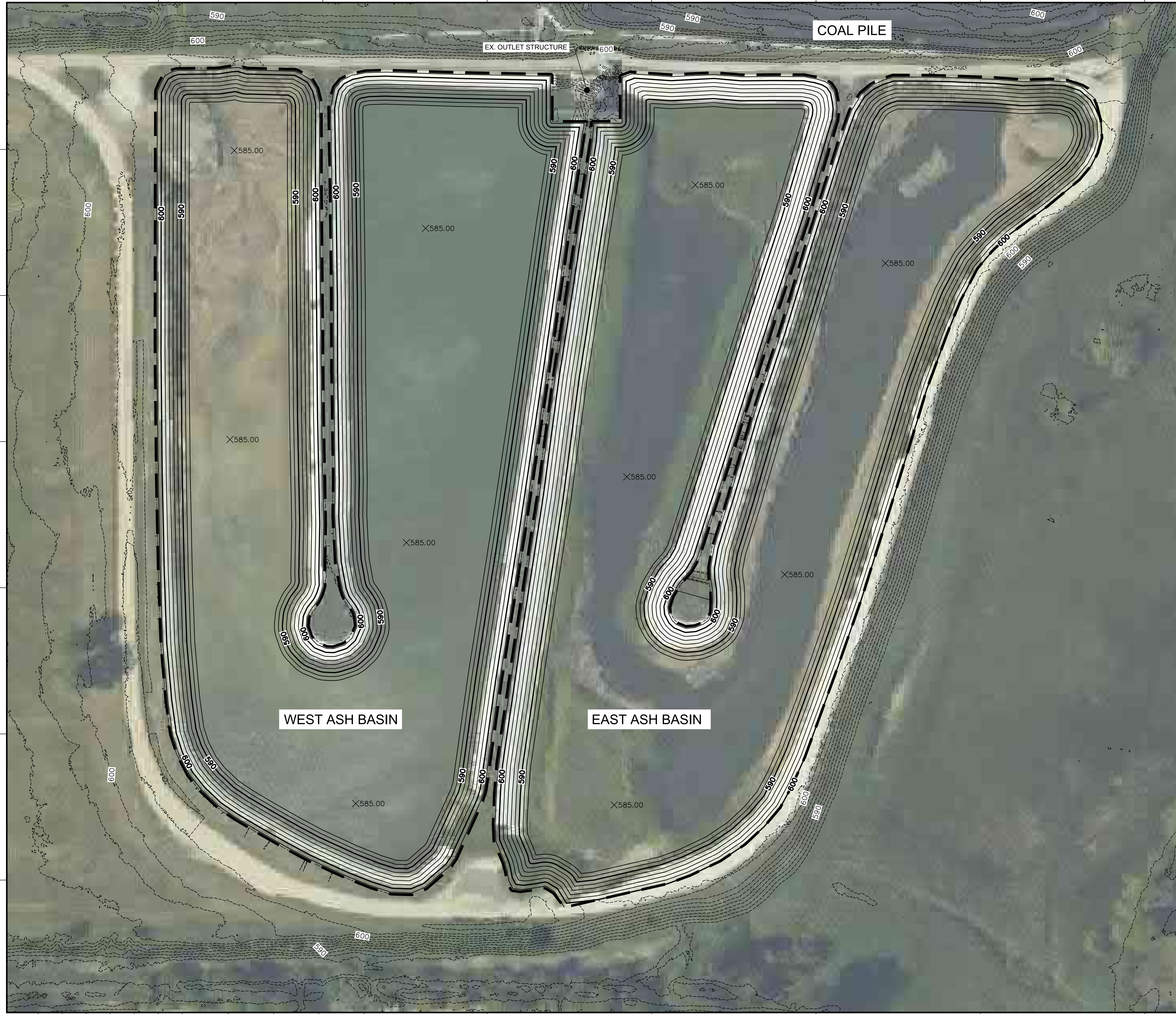
PREPARED FOR:  
MIDWEST GENERATION, LLC

PREPARED BY:  
AECOM

<b>AECOM</b>	<b>TITLE SHEET</b>		
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FOR	ISSUED FOR REVIEW		
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	DATE: 11/02/2021	APPD: JT	
FILENAME: COVER SHEET.DWG	DWG SIZE	DRAWING NO.	REVISION
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REV	DATE	JOB NO.	PROJECT TYPE	DES	DFTR	CHKD	ENG	DESCRIPTION





**LEGEND**

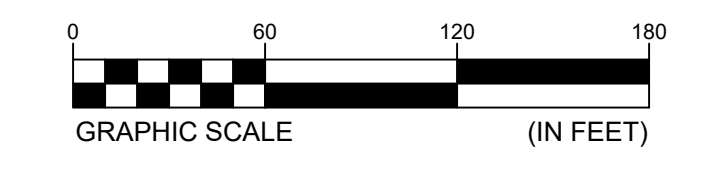
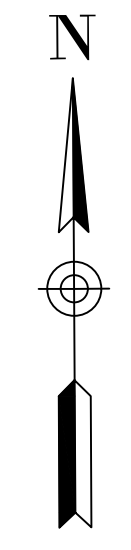
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- EXISTING MINOR TOPOGRAPHIC CONTOUR
- ASH BASIN WASTE BOUNDARY (APPROX.)
- 600 ----- ESTIMATED BOTTOM OF ASH MAJOR TOPOGRAPHIC CONTOUR
- ESTIMATED BOTTOM OF ASH MINOR TOPOGRAPHIC CONTOUR

**NOTES**

1. BASIS OF BEARINGS: NAD83 ILLINOIS STATE PLANES, EAST ZONE. ELEVATIONS ARE BASED ON NAVD88.

**REFERENCES**

1. ESTIMATED BOTTOM OF ASH GRADES ARE BASED ON INFORMATION FOUND IN THE HISTORY OF CONSTRUCTION REPORT, PREPARED BY GEOSYNTEC CONSULTANTS AND DATED OCTOBER 2016.
2. SEE SHEET 03 FOR ADDITIONAL DRAWING REFERENCES.



NOT FOR CONSTRUCTION

<b>AECOM</b>	<b>ESTIMATED BOTTOM OF ASH GRADES</b>		
	WAUKEGAN GENERATING STATION CLOSURE ALTERNATIVES ANALYSIS WAUKEGAN, ILLINOIS		
FOR	<b>ISSUED FOR REVIEW</b>		
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		JOB NO: <b>60669161</b>	CHKD: <b>RB</b>
		DATE: <b>11/15/2021</b>	ENGR: <b>JT</b>
		FILENAME: <b>ESTIMATED BOTTOM OF ASH GRADES.DWG</b>	APPD: <b>JT</b>
ANSI D 22.0"x34.0"	DRAWING NO. <b>02</b>	REVISION <b>A</b>	



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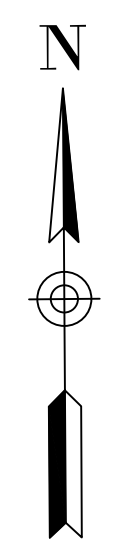
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- 590 ----- EXISTING MINOR TOPOGRAPHIC CONTOUR
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**NOTES**

1. BASIS OF BEARINGS: NAD83 ILLINOIS STATE PLANES, EAST ZONE. ELEVATIONS ARE BASED ON NAVD88.

**REFERENCES**

1. AERIAL IMAGE WAS OBTAINED FROM MICROSOFT BING (2021).
2. ASH BASIN WASTE BOUNDARY IS BASED ON AERIAL IMAGERY AND IS APPROXIMATE.
3. EXISTING TOPOGRAPHY IS BASED ON 2017 LIDAR DATA OBTAINED FROM THE STATE OF ILLINOIS GEOSPATIAL DATA CLEARINGHOUSE.



NOT FOR CONSTRUCTION



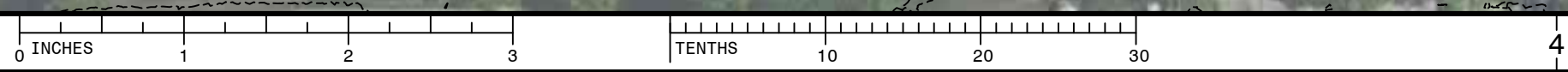
**EXISTING CONDITIONS PLAN**

WAUKEGAN GENERATING STATION  
CLOSURE ALTERNATIVES ANALYSIS  
WAUKEGAN, ILLINOIS

FOR ISSUED FOR REVIEW

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JOB NO: 60669161	CHKD: RB
DATE: 11/15/2021	ENGR: JT
FILENAME: EXISTING CONDITIONS PLAN.DWG	APPD: JT

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- --- EXISTING MINOR TOPOGRAPHIC CONTOUR
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- --- PROPOSED MINOR TOPOGRAPHIC CONTOUR
- >--- DRAINAGE ARROWS

NOTES

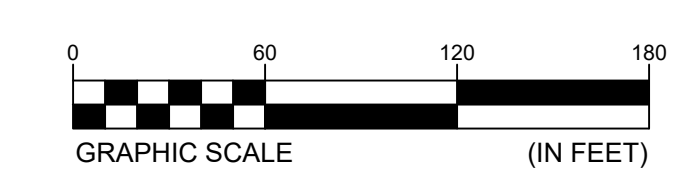
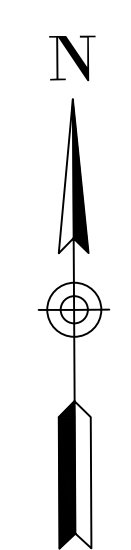
1. BASIS OF BEARINGS: NAD83 ILLINOIS STATE PLANES, EAST ZONE. ELEVATIONS ARE BASED ON NAVD88.
2. PROPOSED GRADING REPRESENTS CLOSURE BY REMOVAL GRADES (I.E., ESTIMATED BOTTOM OF ASH GRADES) IN THE WEST ASH BASIN.
3. CUT SLOPES SHOWN ARE 2.5H:1V.
4. SEE SHEET 10 FOR CROSS SECTIONS.
5. QUANTITIES WERE ESTIMATED BY COMPARING EXISTING GRADES TO PROPOSED GRADES UTILIZING AUTOCAD CIVIL 3D (VERSION 2018).

REFERENCES

1. SEE SHEET 03 FOR DRAWING REFERENCES.

ESTIMATED QUANTITIES

CCR MATERIAL TO BE REMOVED	93,000 CY
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NOT FOR CONSTRUCTION



**WEST ASH BASIN - CLOSURE BY REMOVAL**  
 WAUKEGAN GENERATING STATION  
 CLOSURE ALTERNATIVES ANALYSIS  
 WAUKEGAN, ILLINOIS

ISSUED FOR REVIEW

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	DWG TYPE: .DWG	DFTR: PK
	JOB NO: 60669161	CHKD: RB
	DATE: 11/15/2021	ENGR: JT
FILENAME: WEST BASIN CBR.DWG		APPD: JT

DWG SIZE	DRAWING NO.	REVISION
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**LEGEND**

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- PROPOSED MINOR TOPOGRAPHIC CONTOUR
- > DRAINAGE ARROWS

**NOTES**

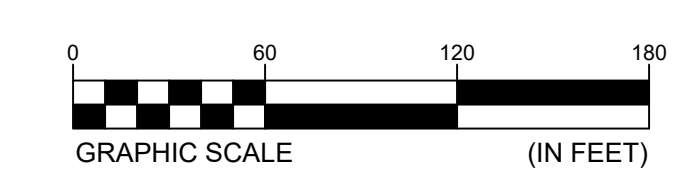
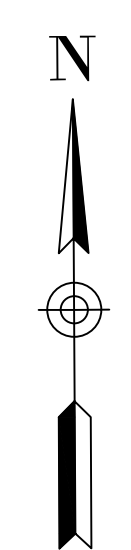
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2. PROPOSED GRADING REPRESENTS TOP OF CLOSURE IN PLACE GRADES FOR THE WEST ASH BASIN.
3. CUT AND FILL SLOPES ARE 6H:1V UNLESS OTHERWISE NOTED.
4. SEE SHEET 11 FOR CROSS SECTIONS.
5. QUANTITIES WERE ESTIMATED BY COMPARING EXISTING GRADES TO PROPOSED GRADES UTILIZING AUTOCAD CIVIL 3D (VERSION 2018) AND ASSUMING A 3-FOOT THICK FINAL COVER SYSTEM.

**REFERENCES**

1. SEE SHEET 03 FOR DRAWING REFERENCES.

**ESTIMATED QUANTITIES**

ASH TO BE REGRADED	5,000 CY
ADDITIONAL FILL NEEDED TO ACHIEVE SUBGRADE GRADES	68,000 CY
FILL NEEDED FOR FINAL COVER SYSTEM	50,000 CY
FINAL COVER SYSTEM GEOSYNTHETICS	50,000 SY



NOT FOR CONSTRUCTION



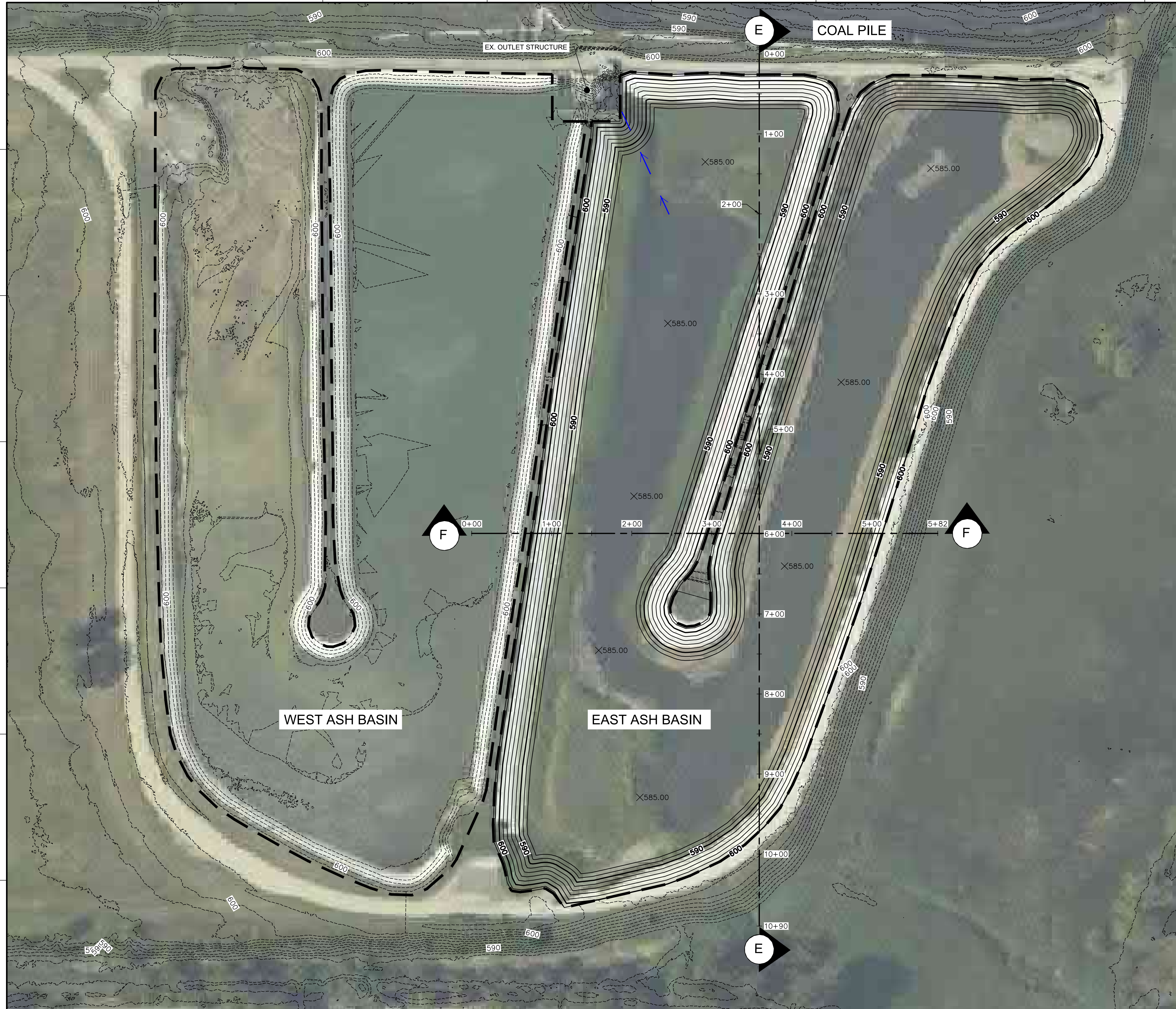
**WEST ASH BASIN - CLOSURE IN PLACE**

WAUKEGAN GENERATING STATION  
CLOSURE ALTERNATIVES ANALYSIS  
WAUKEGAN, ILLINOIS

FOR ISSUED FOR REVIEW

SEAL	SCALE: AS SHOWN	DES: MR
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	JOB NO: 60669161	CHKD: RB
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DWG SIZE	DRAWING NO.	REVISION
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**LEGEND**

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- EXISTING MINOR TOPOGRAPHIC CONTOUR
- ASH BASIN WASTE BOUNDARY (APPROX.)
- 600 ----- PROPOSED MAJOR TOPOGRAPHIC CONTOUR
- PROPOSED MINOR TOPOGRAPHIC CONTOUR
- > DRAINAGE ARROWS

**NOTES**

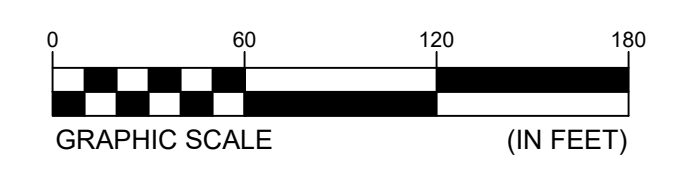
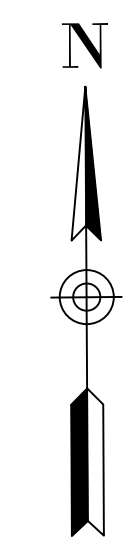
1. BASIS OF BEARINGS: NAD83 ILLINOIS STATE PLANES, EAST ZONE. ELEVATIONS ARE BASED ON NAVD88.
2. PROPOSED GRADING REPRESENTS CLOSURE BY REMOVAL GRADES (I.E., ESTIMATED BOTTOM OF ASH GRADES) IN THE EAST ASH BASIN.
3. CUT SLOPES SHOWN ARE 2.5H:1V.
4. SEE SHEET 12 FOR CROSS SECTIONS.
5. QUANTITIES WERE ESTIMATED BY COMPARING EXISTING GRADES TO PROPOSED GRADES UTILIZING AUTOCAD CIVIL 3D (VERSION 2018).

**REFERENCES**

1. SEE SHEET 03 FOR DRAWING REFERENCES.

**ESTIMATED QUANTITIES**

CCR MATERIAL TO BE REMOVED	70,000 CY
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NOT FOR CONSTRUCTION

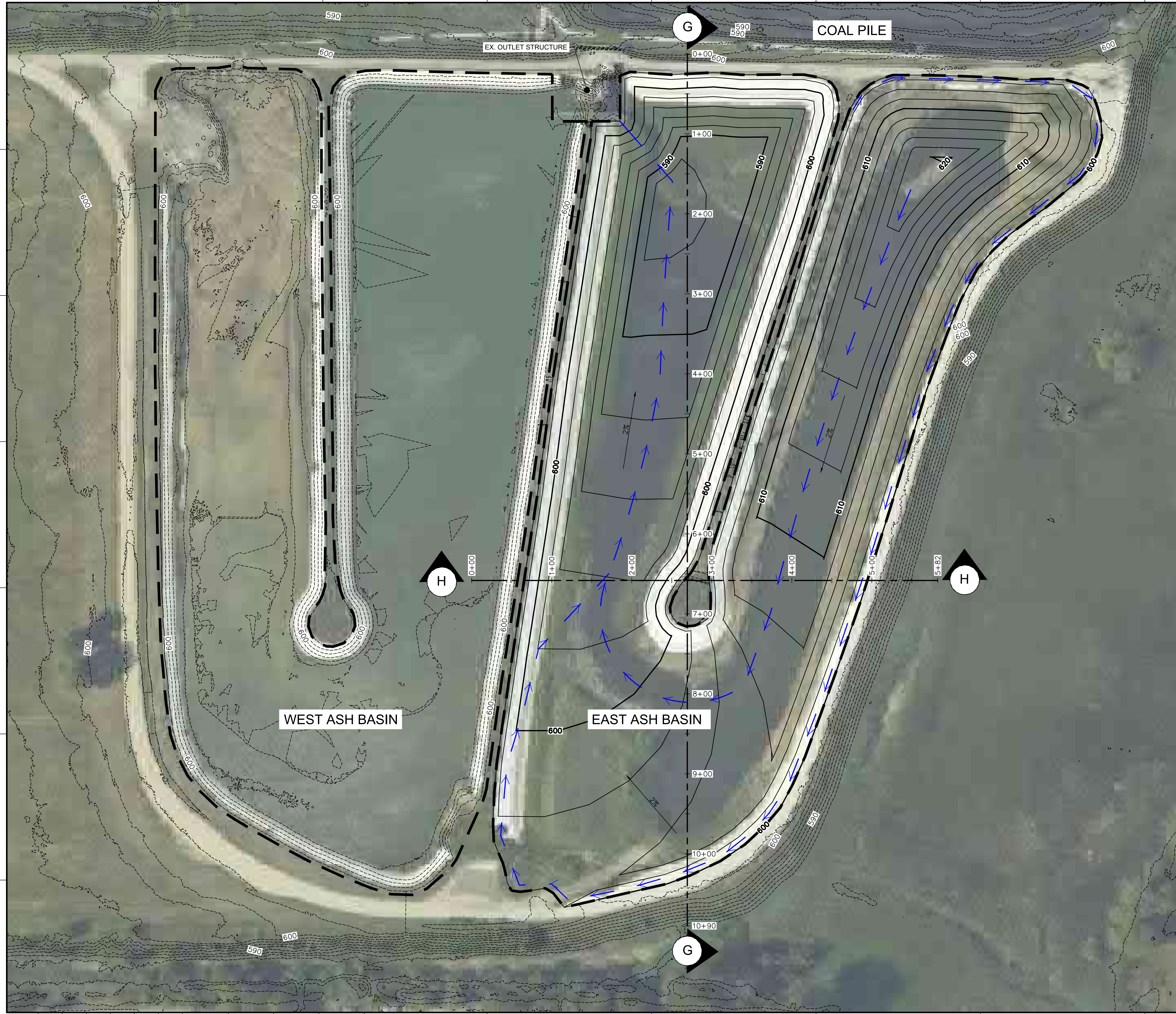


**EAST ASH BASIN - CLOSURE BY REMOVAL**  
 WAUKEGAN GENERATING STATION  
 CLOSURE ALTERNATIVES ANALYSIS  
 WAUKEGAN, ILLINOIS

ISSUED FOR REVIEW

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	JOB NO: 60669161	CHKD: RB
	DATE: 11/15/2021	ENGR: JT
	APPD: JT	

FILENAME: EAST BASIN CBR.DWG	DRAWING NO.	REVISION
ANSI D 22.0"x34.0"	06	A



**LEGEND**

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- EXISTING MINOR TOPOGRAPHIC CONTOUR
- ASH BASIN WASTE BOUNDARY (APPROX.)
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- PROPOSED MINOR TOPOGRAPHIC CONTOUR
- >----- DRAINAGE ARROWS

**NOTES**

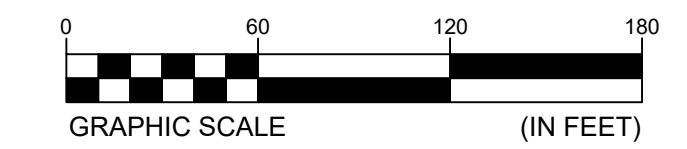
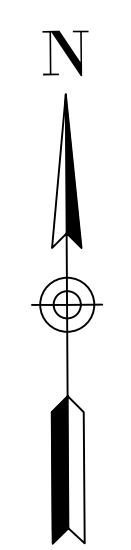
1. BASIS OF BEARINGS: NAD83 ILLINOIS STATE PLANES, EAST ZONE. ELEVATIONS ARE BASED ON NAVD88.
2. PROPOSED GRADING REPRESENTS TOP OF CLOSURE IN PLACE GRADES FOR THE EAST ASH BASIN.
3. CUT AND FILL SLOPES ARE 6H:1V UNLESS OTHERWISE NOTED.
4. SEE SHEET 13 FOR CROSS SECTIONS.
5. QUANTITIES WERE ESTIMATED BY COMPARING EXISTING GRADES TO PROPOSED GRADES UTILIZING AUTOCAD CIVIL 3D (VERSION 2018) AND ASSUMING A 3-FOOT THICK FINAL COVER SYSTEM.

**REFERENCES**

1. SEE SHEET 03 FOR DRAWING REFERENCES.

**ESTIMATED QUANTITIES**

FILL NEEDED TO ACHIEVE SUBGRADE GRADES	108,000 CY
FILL NEEDED FOR FINAL COVER SYSTEM	51,000 CY
FINAL COVER SYSTEM GEOSYNTHETICS	51,000 SY



NOT FOR CONSTRUCTION



**EAST ASH BASIN - CLOSURE IN PLACE (OPTION 1)**  
 WAUKEGAN GENERATING STATION  
 CLOSURE ALTERNATIVES ANALYSIS  
 WAUKEGAN, ILLINOIS

ISSUED FOR REVIEW

SCALE: AS SHOWN	DES: MR
DWG TYPE: .DWG	DFTR: PK
JOB NO: 60669161	CHKD: RB
DATE: 11/15/2021	ENGR: JT
APPD: JT	

FILENAME: EAST BASIN CIP MINIMUM.DWG

DWG SIZE	DRAWING NO.	REVISION
ANSI D 22.0"x34.0"	<b>07</b>	<b>A</b>





**LEGEND**

- 600 ----- EXISTING MAJOR TOPOGRAPHIC CONTOUR
- EXISTING MINOR TOPOGRAPHIC CONTOUR
- ASH BASIN WASTE BOUNDARY (APPROX.)
- 600 ----- PROPOSED MAJOR TOPOGRAPHIC CONTOUR
- PROPOSED MINOR TOPOGRAPHIC CONTOUR
- > DRAINAGE ARROWS

**NOTES**

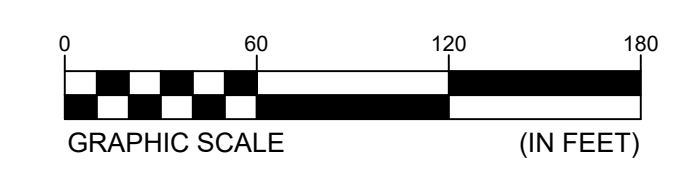
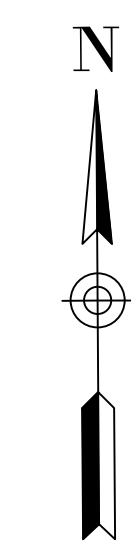
1. BASIS OF BEARINGS: NAD83 ILLINOIS STATE PLANES, EAST ZONE. ELEVATIONS ARE BASED ON NAVD88.
2. PROPOSED GRADING REPRESENTS TOP OF CLOSURE IN PLACE GRADES FOR THE EAST ASH BASIN.
3. CUT AND FILL SLOPES ARE 6H:1V UNLESS OTHERWISE NOTED.
4. SEE SHEET 14 FOR CROSS SECTIONS.
5. QUANTITIES WERE ESTIMATED BY COMPARING EXISTING GRADES TO PROPOSED GRADES UTILIZING AUTOCAD CIVIL 3D (VERSION 2018) AND ASSUMING A 3-FOOT THICK FINAL COVER SYSTEM.

**REFERENCES**

1. SEE SHEET 03 FOR DRAWING REFERENCES.

**ESTIMATED QUANTITIES**

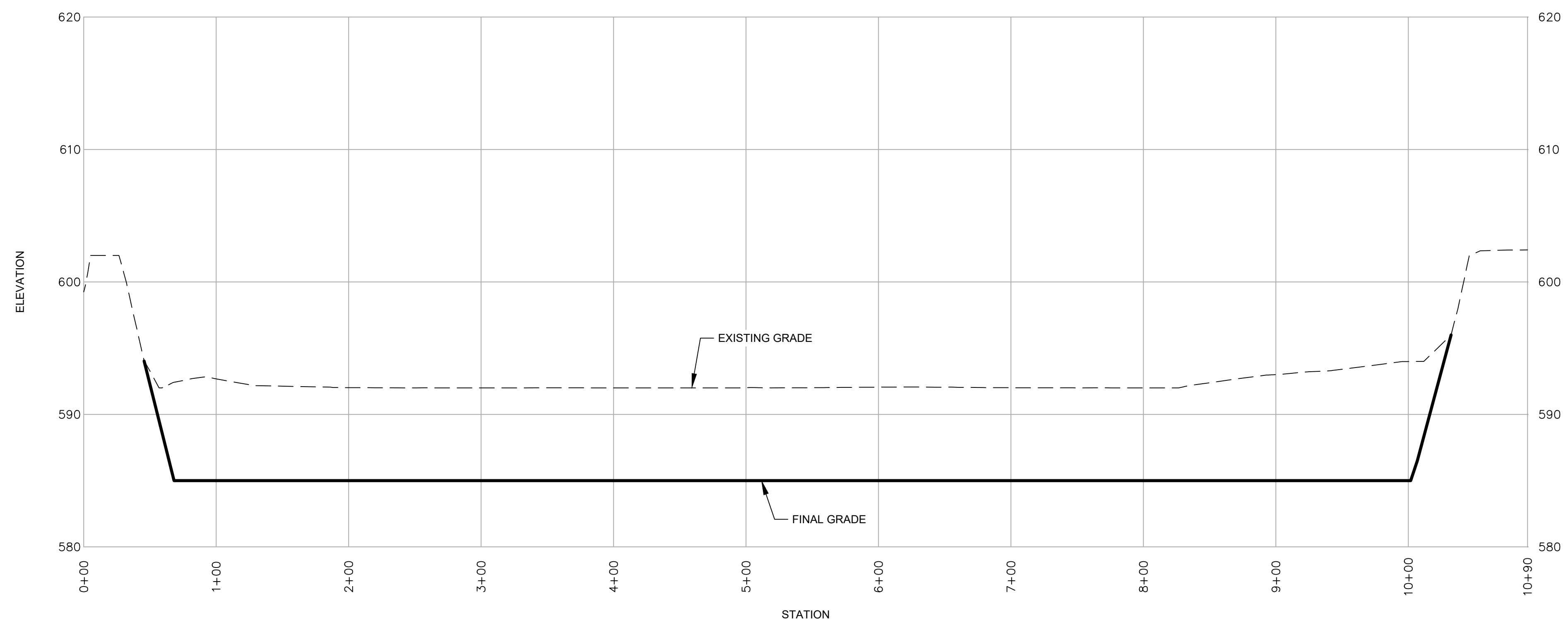
FILL NEEDED TO ACHIEVE SUBGRADE GRADES	368,000 CY
FILL NEEDED FOR FINAL COVER SYSTEM	53,000 CY
FINAL COVER SYSTEM GEOSYNTHETICS	53,000 SY



NOT FOR CONSTRUCTION

<b>AECOM</b>	<b>EAST ASH BASIN - CLOSURE IN PLACE (OPTION 2)</b>		
	WAUKEGAN GENERATING STATION CLOSURE ALTERNATIVES ANALYSIS WAUKEGAN, ILLINOIS		
<b>ISSUED FOR REVIEW</b>			
SEAL	SCALE: AS SHOWN	DES: MR	
	DWG TYPE: .DWG	DFTR: PK	
	JOB NO: 60669161	CHKD: RB	
	DATE: 11/15/2021	ENGR: JT	
FILENAME: EAST BASIN CIP MAXIMUM.DWG			
DWG SIZE	DRAWING NO.	REVISION	
ANSI D 22.0"x34.0"	<b>08</b>	<b>A</b>	





West Ash Basin A-A

LEGEND

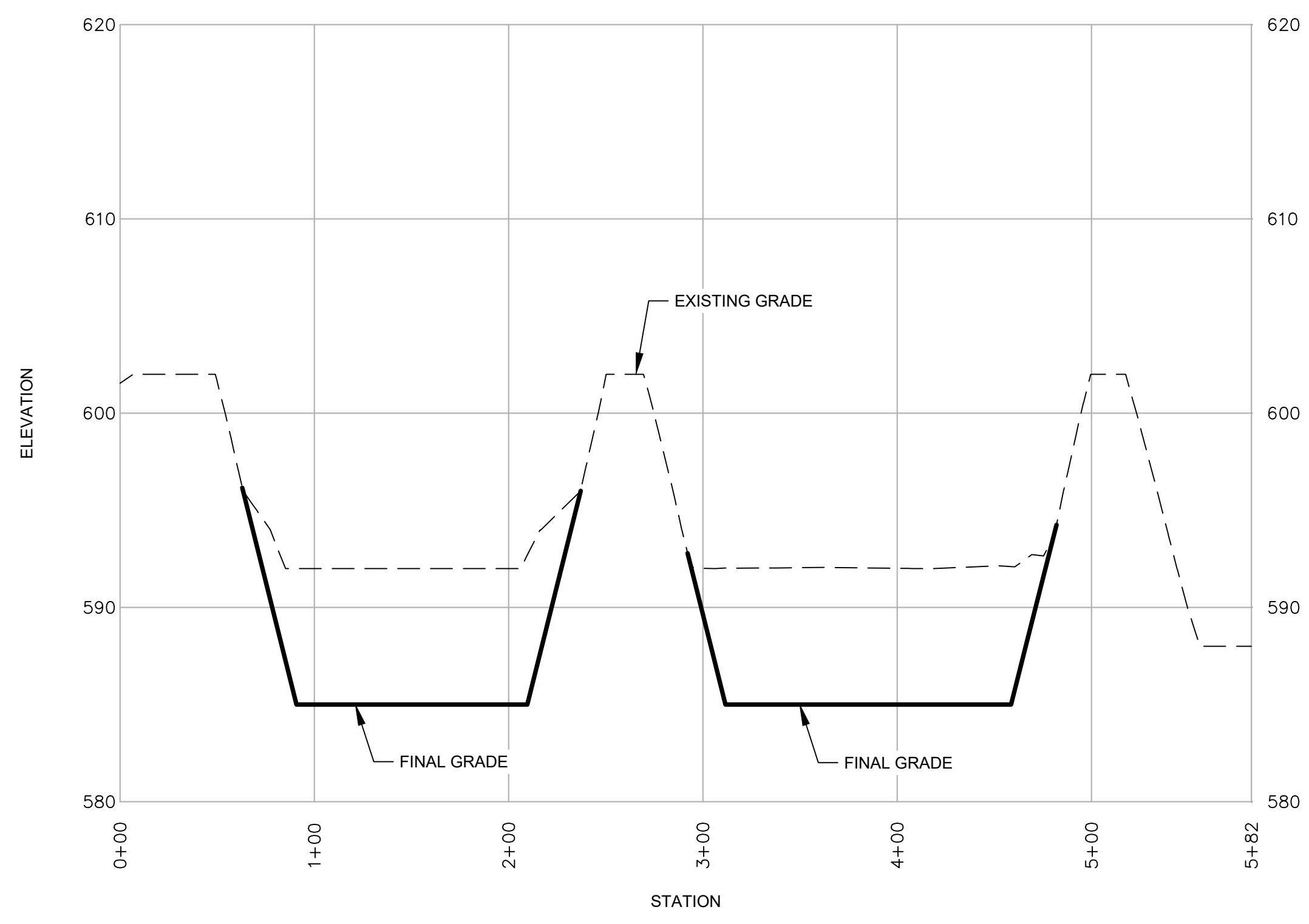
- EXISTING GRADE
- FINAL GRADE
- .-.- ESTIMATED BOTTOM OF ASH GRADE

NOTES

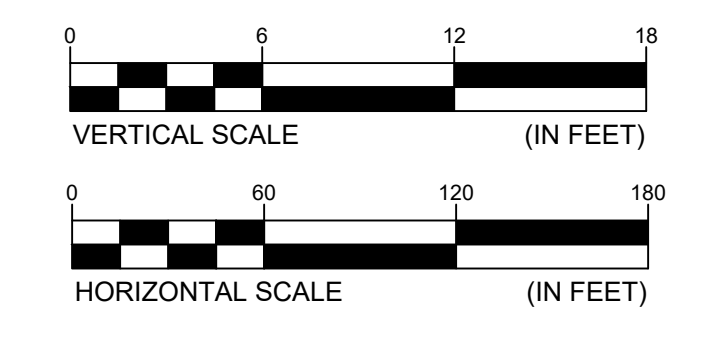
1. BASIS OF BEARINGS: NAD83 ILLINOIS STATE PLANES, EAST ZONE. ELEVATIONS ARE BASED ON NAVD88.

REFERENCES

1. SEE SHEETS 02 AND 03 FOR DRAWING REFERENCES.



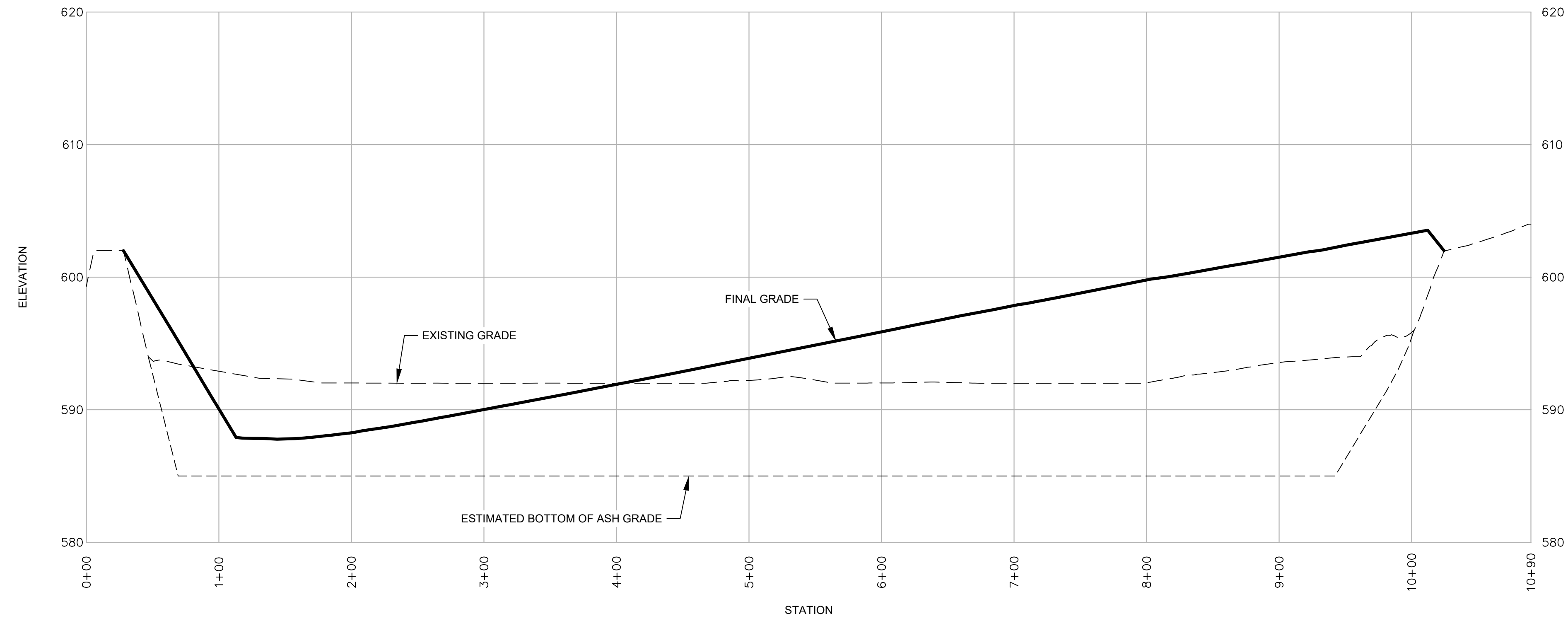
West Ash Basin B-B



NOT FOR CONSTRUCTION

<b>AECOM</b>	<b>CROSS SECTIONS - WEST ASH BASIN - CLOSURE BY REMOVAL</b>		
	WAUKEGAN GENERATING STATION CLOSURE ALTERNATIVES ANALYSIS WAUKEGAN, ILLINOIS		
FOR	<b>ISSUED FOR REVIEW</b>		
SEAL	SCALE: <b>AS SHOWN</b>	DES: <b>MR</b>	
	DWG TYPE: <b>DWG</b>	DFTR: <b>PK</b>	
	JOB NO: <b>60669161</b>	CHKD: <b>RB</b>	
	DATE: <b>11/15/2021</b>	ENGR: <b>JT</b>	
	APPD: <b>JT</b>		
FILENAME: <b>CROSS SECTIONS.DWG</b>			
DWG SIZE	DRAWING NO.	REVISION	
ANSI D 22.0"x34.0"	<b>09</b>	<b>A</b>	





West Ash Basin C-C

LEGEND

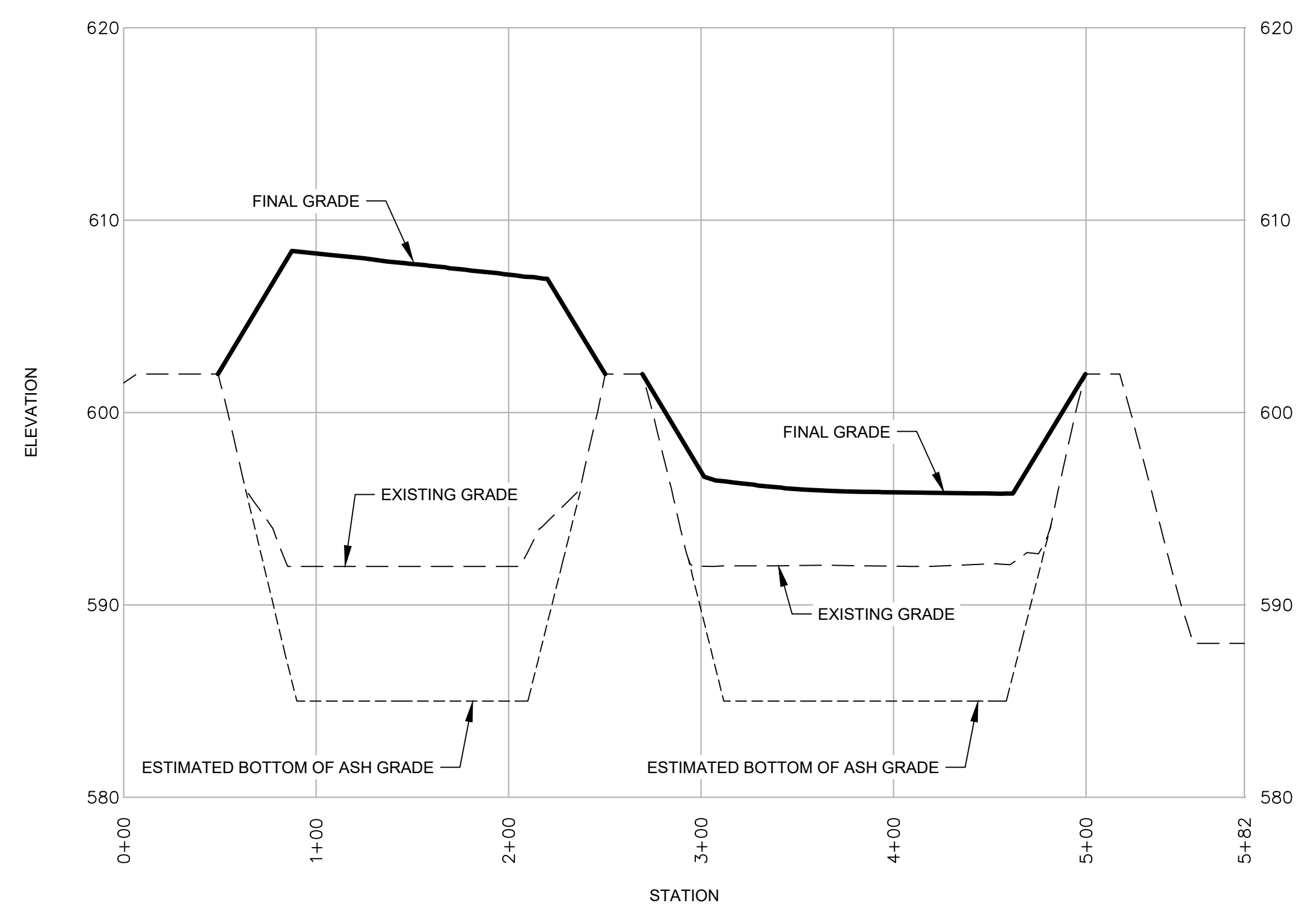
- EXISTING GRADE
- FINAL GRADE
- · - · ESTIMATED BOTTOM OF ASH GRADE

NOTES

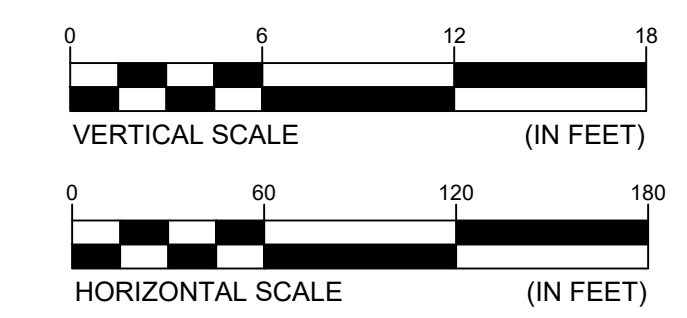
1. BASIS OF BEARINGS: NAD83 ILLINOIS STATE PLANES, EAST ZONE. ELEVATIONS ARE BASED ON NAVD88.

REFERENCES

1. SEE SHEETS 02 AND 03 FOR DRAWING REFERENCES.

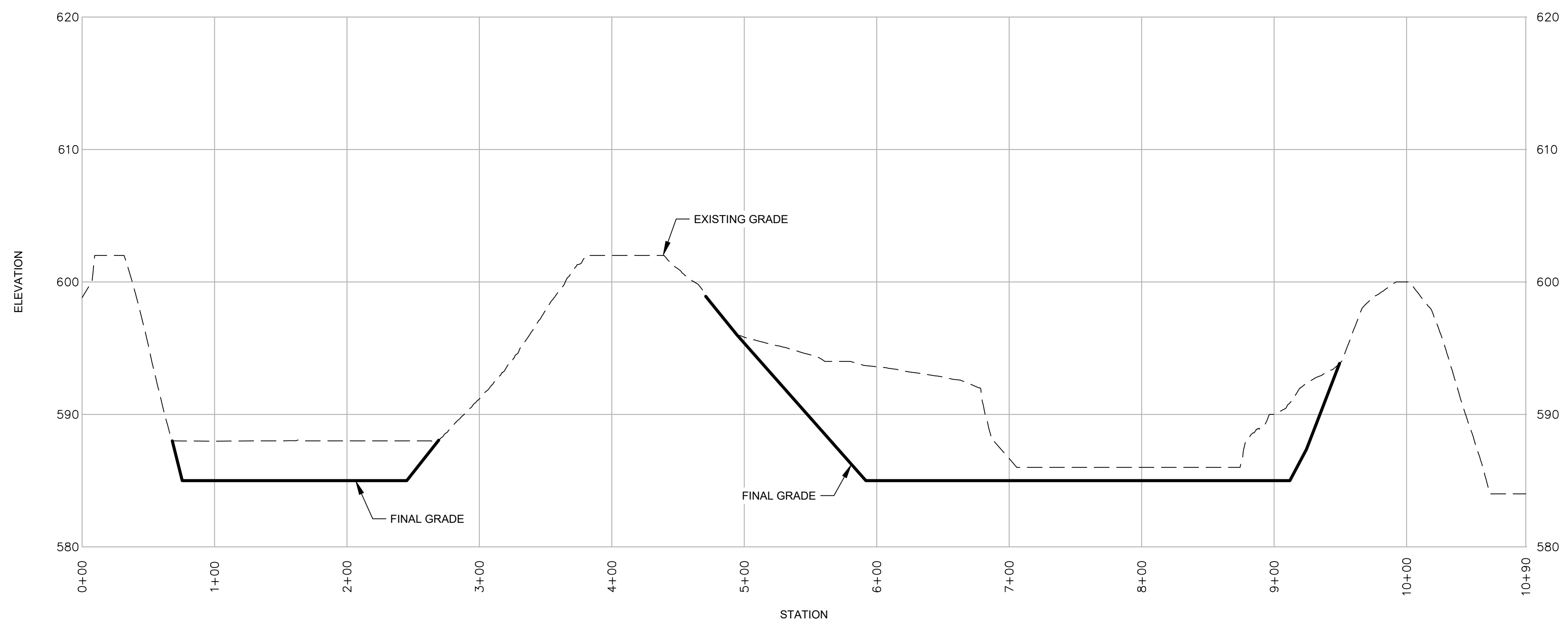


West Ash Basin D-D



NOT FOR CONSTRUCTION

<b>AECOM</b>	<b>CROSS SECTIONS - WEST ASH BASIN - CLOSURE IN PLACE</b>		
	WAUKEGAN GENERATING STATION CLOSURE ALTERNATIVES ANALYSIS WAUKEGAN, ILLINOIS		
	FOR <b>ISSUED FOR REVIEW</b>		
	SCALE: <b>AS SHOWN</b>	DES: <b>MR</b>	DFTR: <b>PK</b>
DWG TYPE: <b>DWG</b>	JOB NO: <b>60669161</b>	CHKD: <b>RB</b>	
DATE: <b>11/15/2021</b>	ENGR: <b>JT</b>	APPD: <b>JT</b>	
FILENAME: <b>CROSS SECTIONS.DWG</b>			
DWG SIZE ANSI D 22.0"x34.0"	DRAWING NO. <b>10</b>	REVISION <b>A</b>	



LEGEND

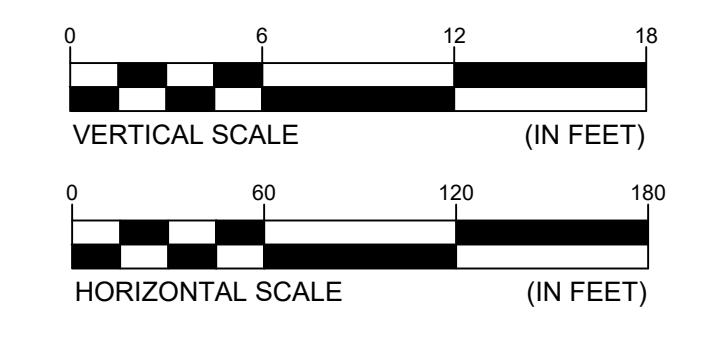
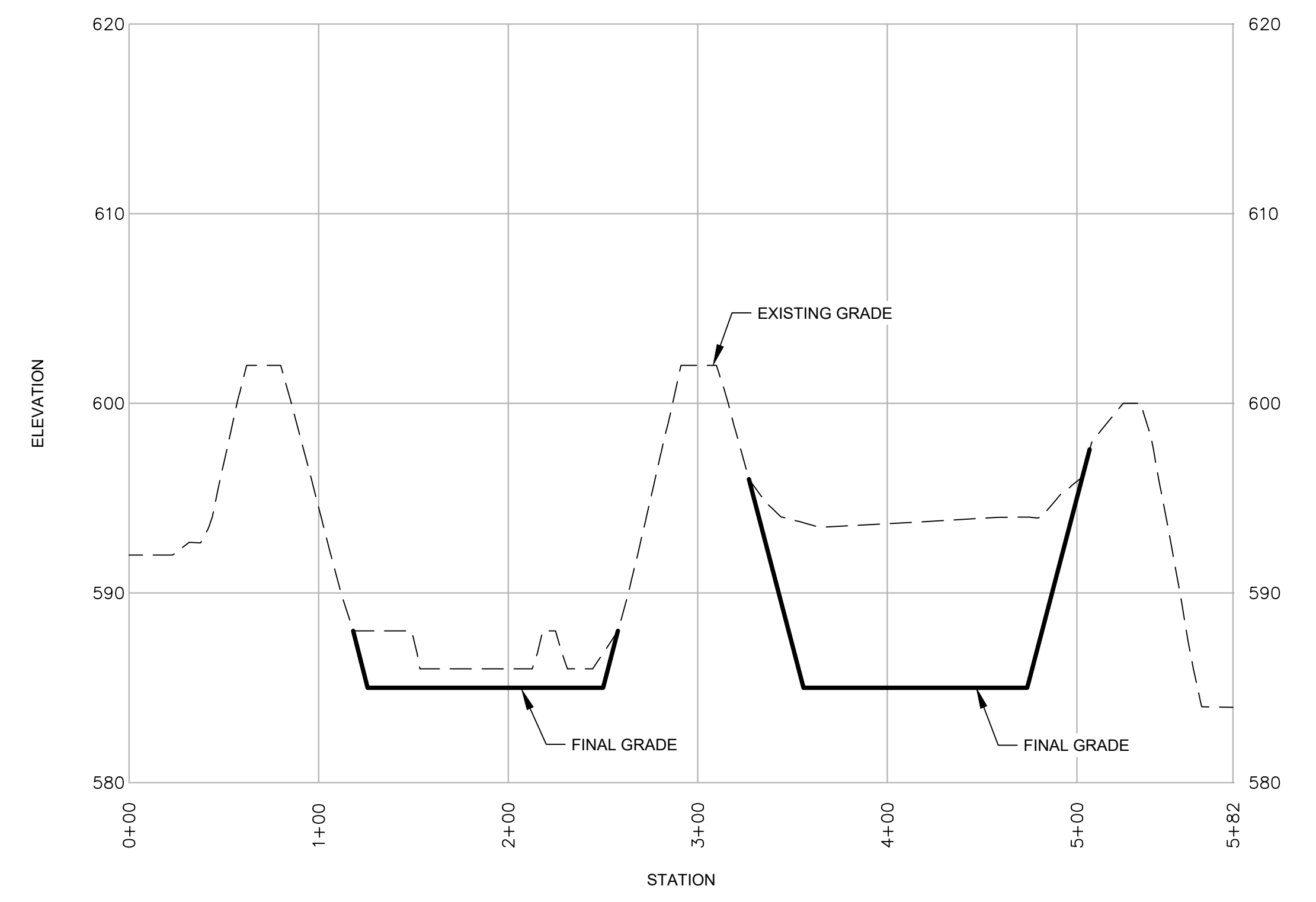
- EXISTING GRADE
- FINAL GRADE
- · - · ESTIMATED BOTTOM OF ASH GRADE

NOTES

1. BASIS OF BEARINGS: NAD83 ILLINOIS STATE PLANES, EAST ZONE. ELEVATIONS ARE BASED ON NAVD88.

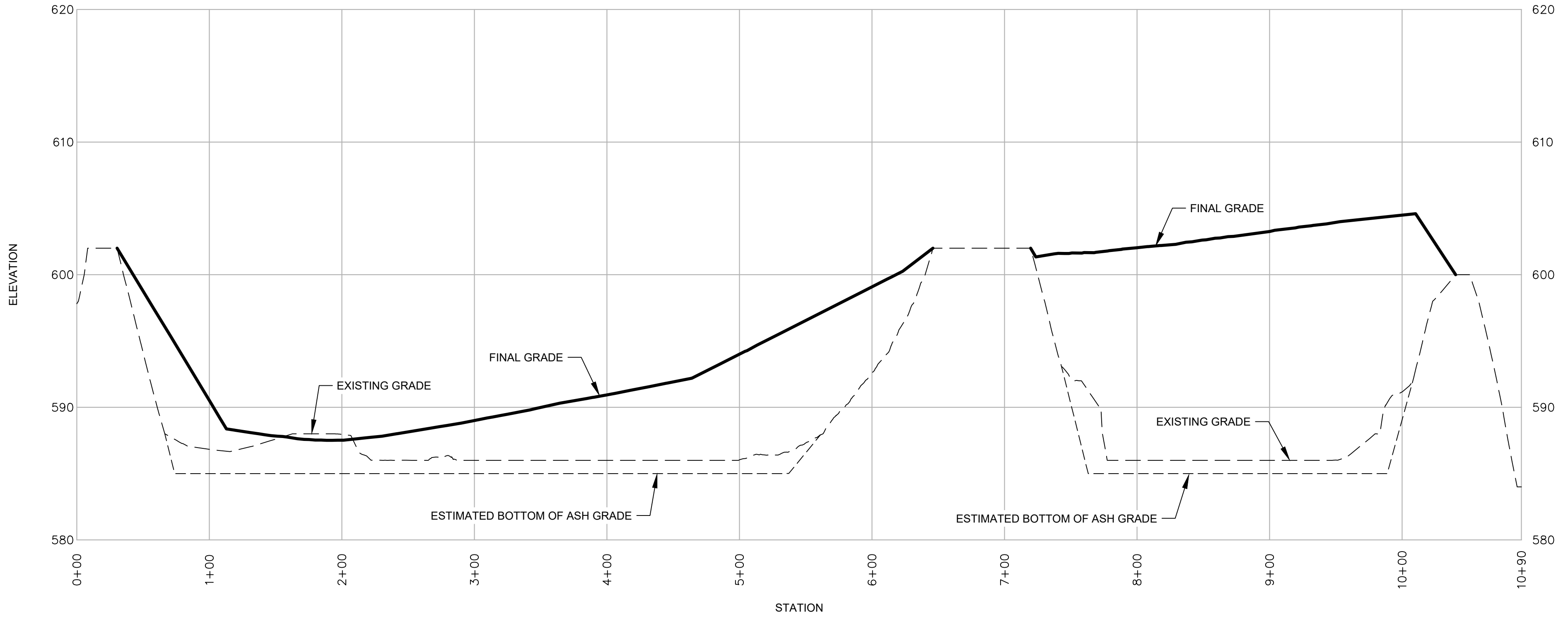
REFERENCES

1. SEE SHEETS 02 AND 03 FOR DRAWING REFERENCES.



NOT FOR CONSTRUCTION

<b>AECOM</b>	<b>CROSS SECTIONS - EAST ASH BASIN - CLOSURE BY REMOVAL</b>		
	WAUKEGAN GENERATING STATION CLOSURE ALTERNATIVES ANALYSIS WAUKEGAN, ILLINOIS		
SEAL	FOR <b>ISSUED FOR REVIEW</b>		
	SCALE: <b>AS SHOWN</b>	DES: <b>MR</b>	
	DWG TYPE: <b>DWG</b>	DFTR: <b>PK</b>	
	JOB NO: <b>60669161</b>	CHKD: <b>RB</b>	
	DATE: <b>11/15/2021</b>	ENGR: <b>JT</b>	
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DWG SIZE	DRAWING NO.	REVISION	
ANSI D 22.0"x34.0"	<b>11</b>	<b>A</b>	



East Ash Basin G-G

LEGEND

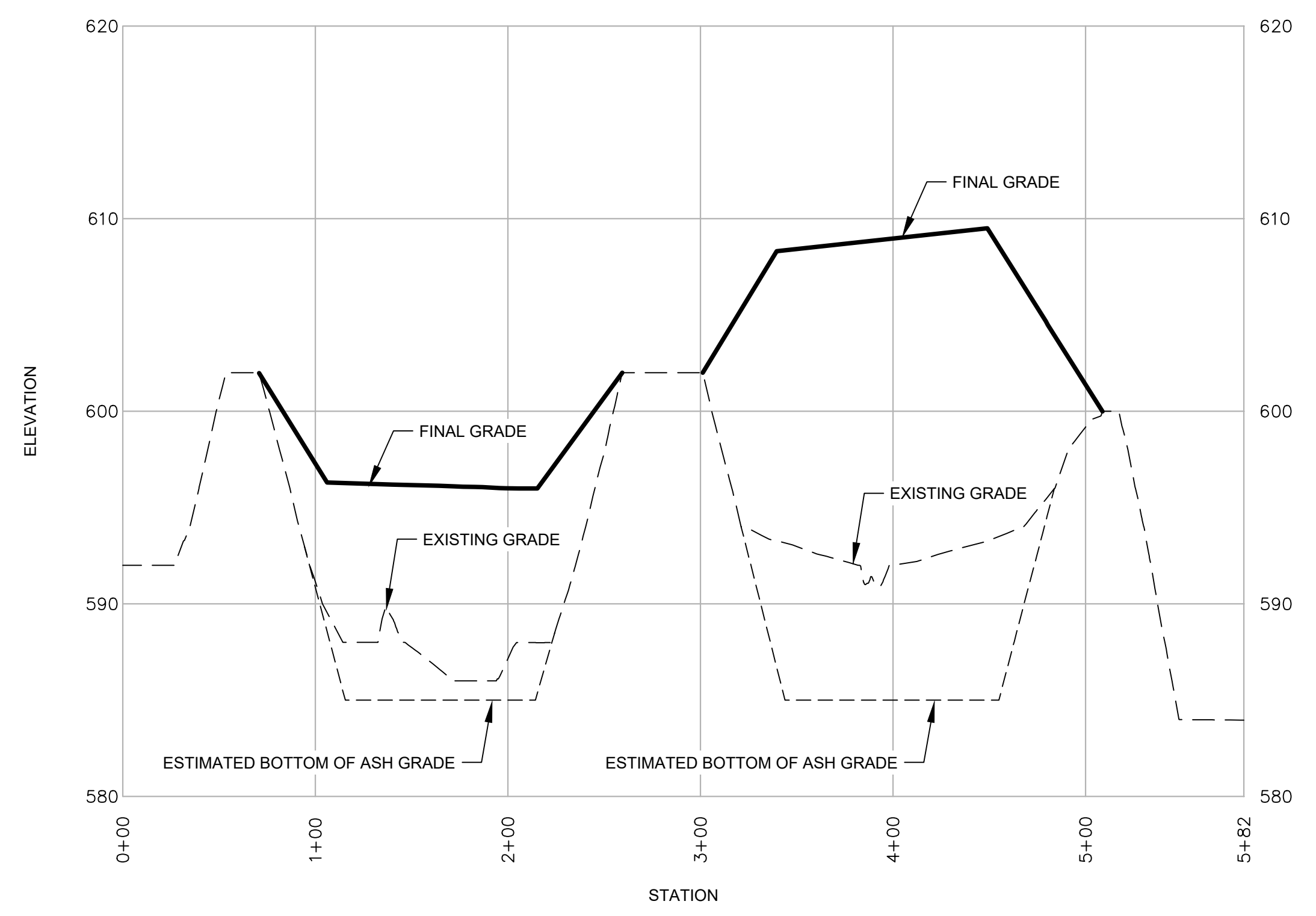
- EXISTING GRADE
- FINAL GRADE
- · - · ESTIMATED BOTTOM OF ASH GRADE

NOTES

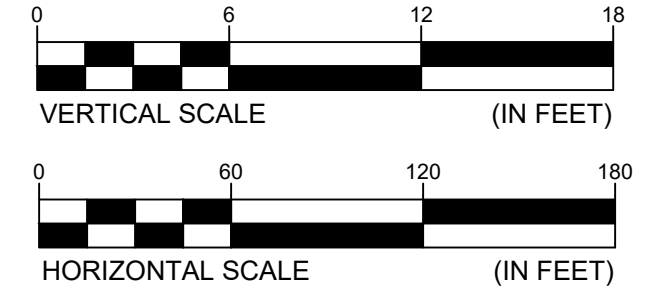
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REFERENCES

1. SEE SHEETS 02 AND 03 FOR DRAWING REFERENCES.

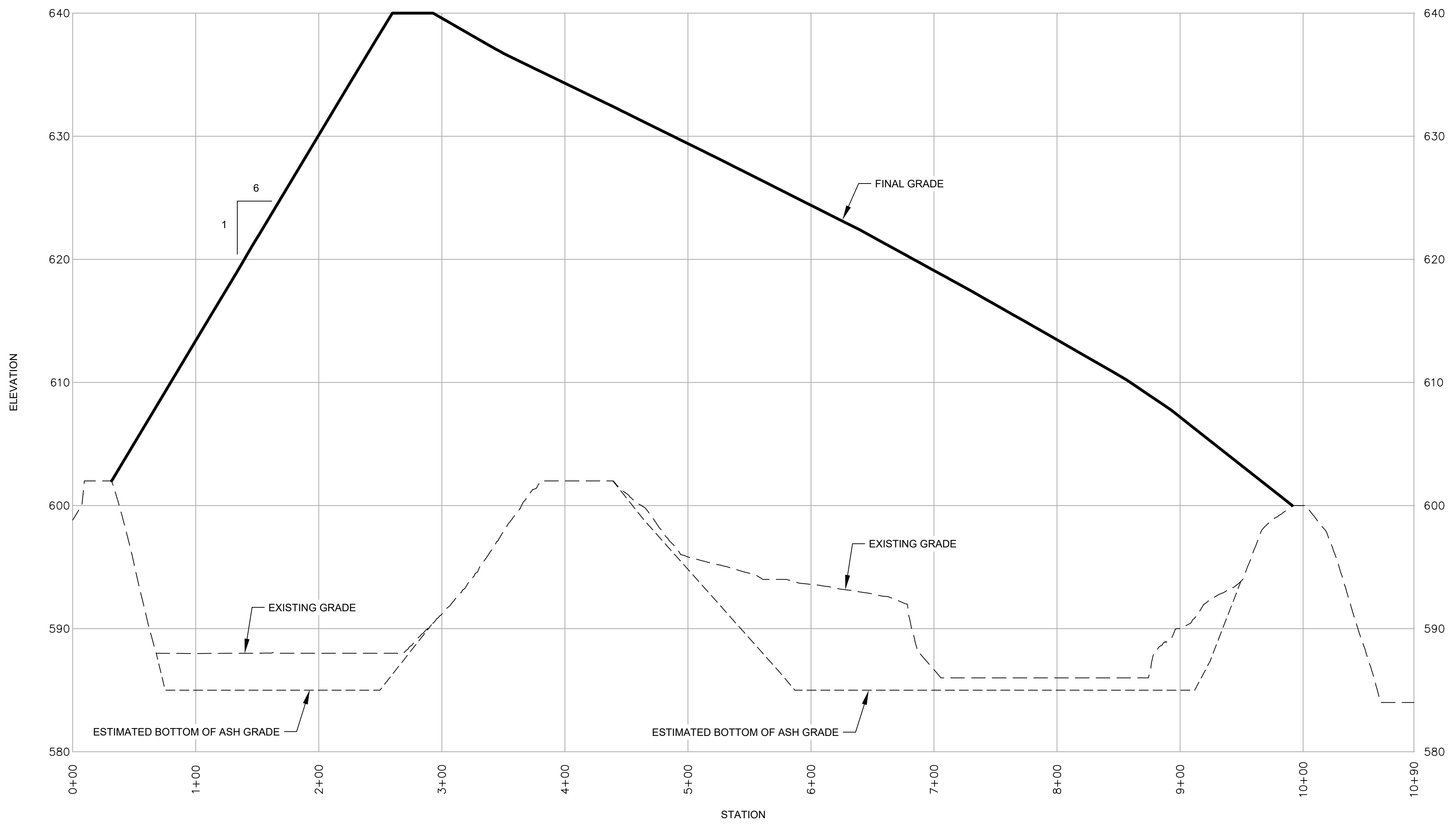


East Ash Basin H-H

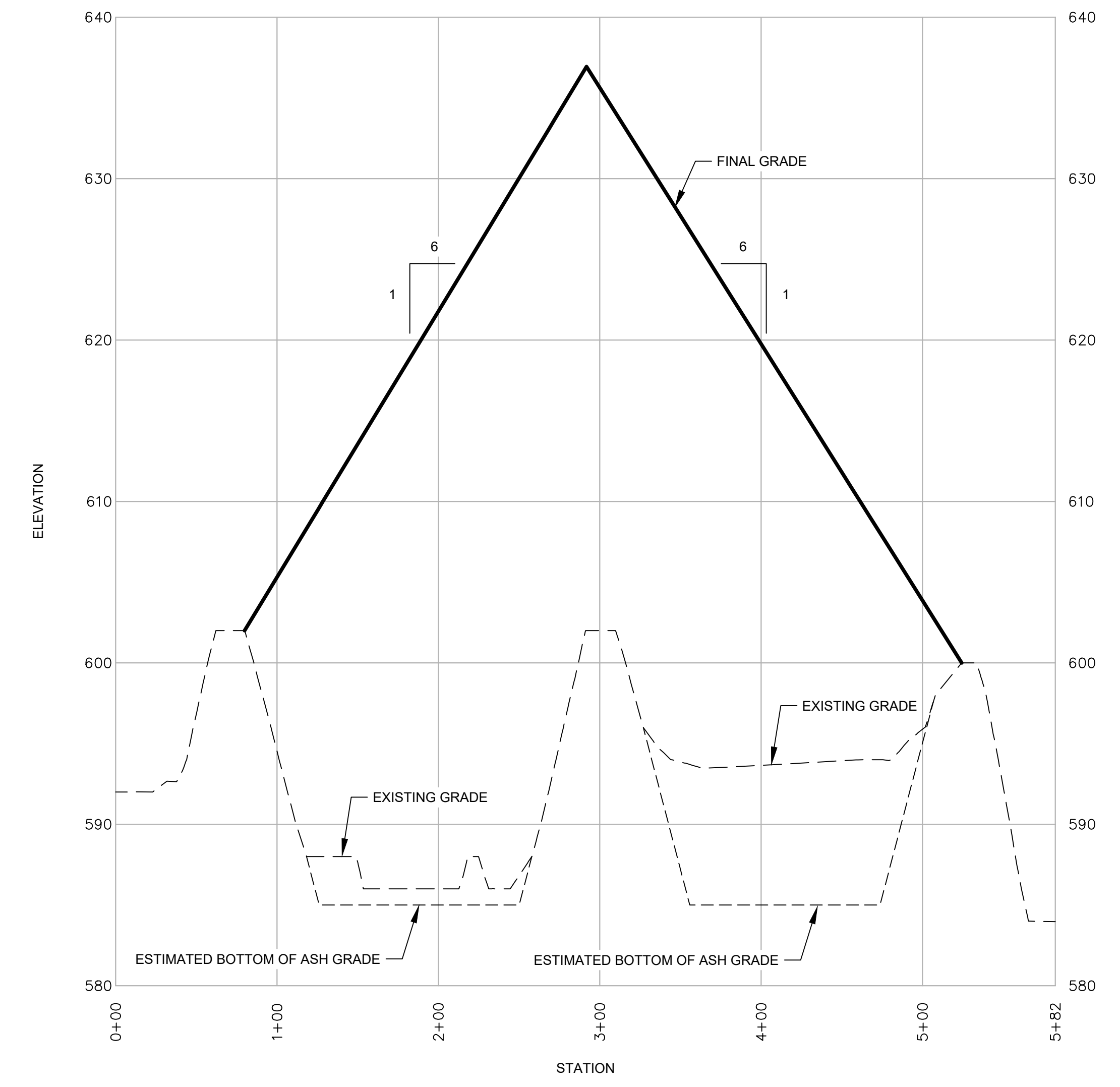


NOT FOR CONSTRUCTION

<b>AECOM</b>	<b>CROSS SECTIONS - EAST ASH BASIN - CLOSURE IN PLACE (OPTION 1)</b>		
	WAUKEGAN GENERATING STATION CLOSURE ALTERNATIVES ANALYSIS WAUKEGAN, ILLINOIS		
FOR	<b>ISSUED FOR REVIEW</b>		
SEAL	SCALE: AS SHOWN	DES: MR	
	DWG TYPE: DWG	DFTR: PK	
	JOB NO: 60669161	CHKD: RB	
	DATE: 11/15/2021	ENGR: JT	
	APPD: JT		
FILENAME: CROSS SECTIONS.DWG			
DWG SIZE	DRAWING NO.	REVISION	
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East Ash Basin I-I



East Ash Basin J-J

**LEGEND**

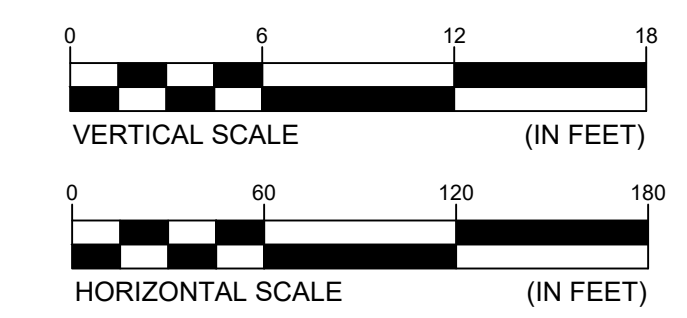
- EXISTING GRADE
- FINAL GRADE
- .-.- ESTIMATED BOTTOM OF ASH GRADE

**NOTES**

1. BASIS OF BEARINGS: NAD83 ILLINOIS STATE PLANES, EAST ZONE. ELEVATIONS ARE BASED ON NAVD88.

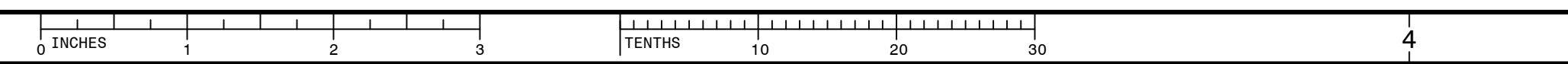
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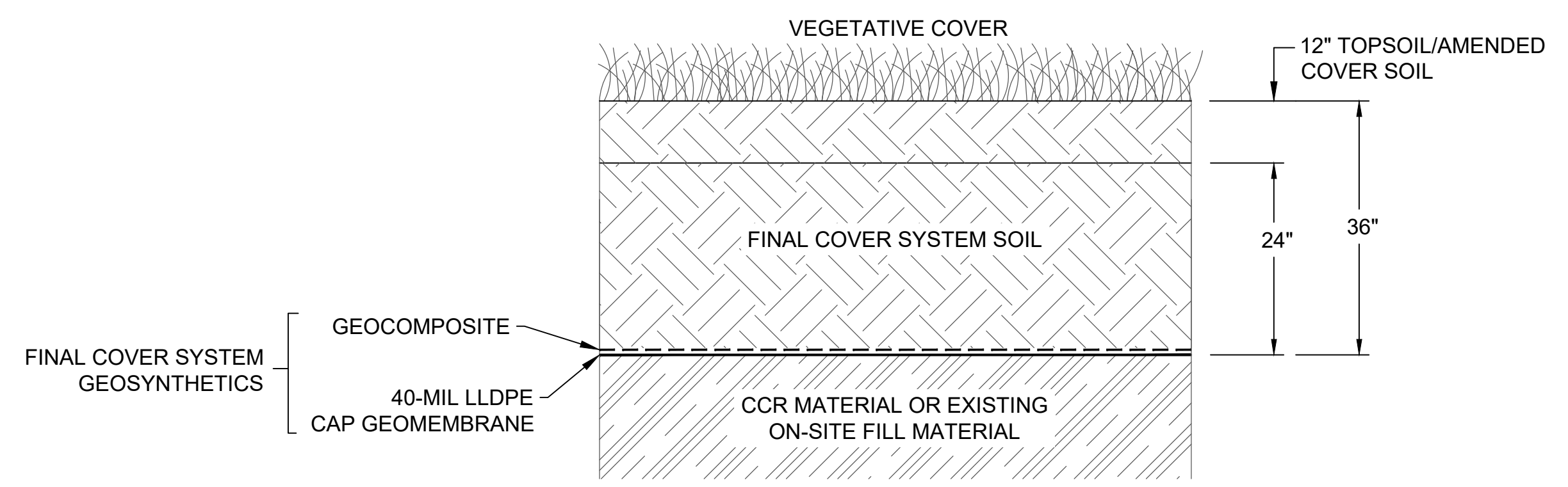
1. SEE SHEETS 02 AND 03 FOR DRAWING REFERENCES.



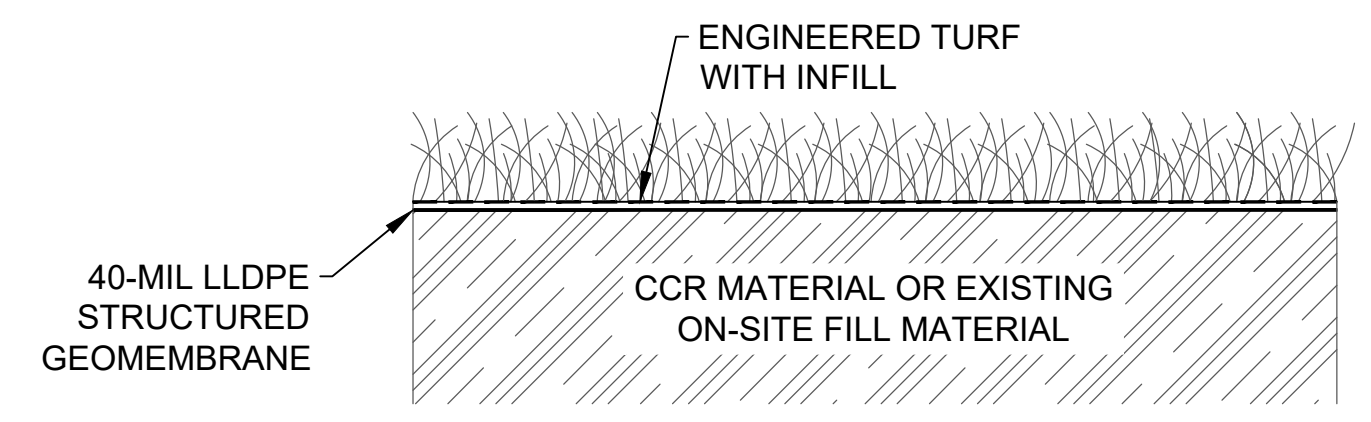
NOT FOR CONSTRUCTION

<b>AECOM</b>	<b>CROSS SECTIONS - EAST ASH BASIN - CLOSURE IN PLACE (OPTION 2)</b>		
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FOR	<b>ISSUED FOR REVIEW</b>		
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	DWG TYPE: <b>.DWG</b>	JOB NO: <b>60669161</b>	CHKD: <b>RB</b>
	DATE: <b>11/15/2021</b>	ENGR: <b>JT</b>	APPD: <b>JT</b>
FILENAME: <b>CROSS SECTIONS.DWG</b>			
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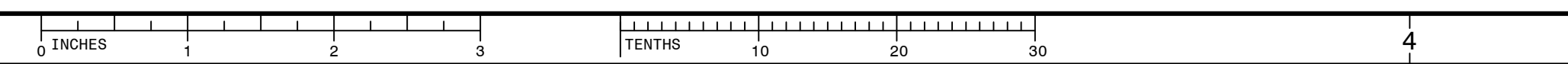
**1** TYPICAL FINAL COVER SYSTEM  
16 NOT TO SCALE



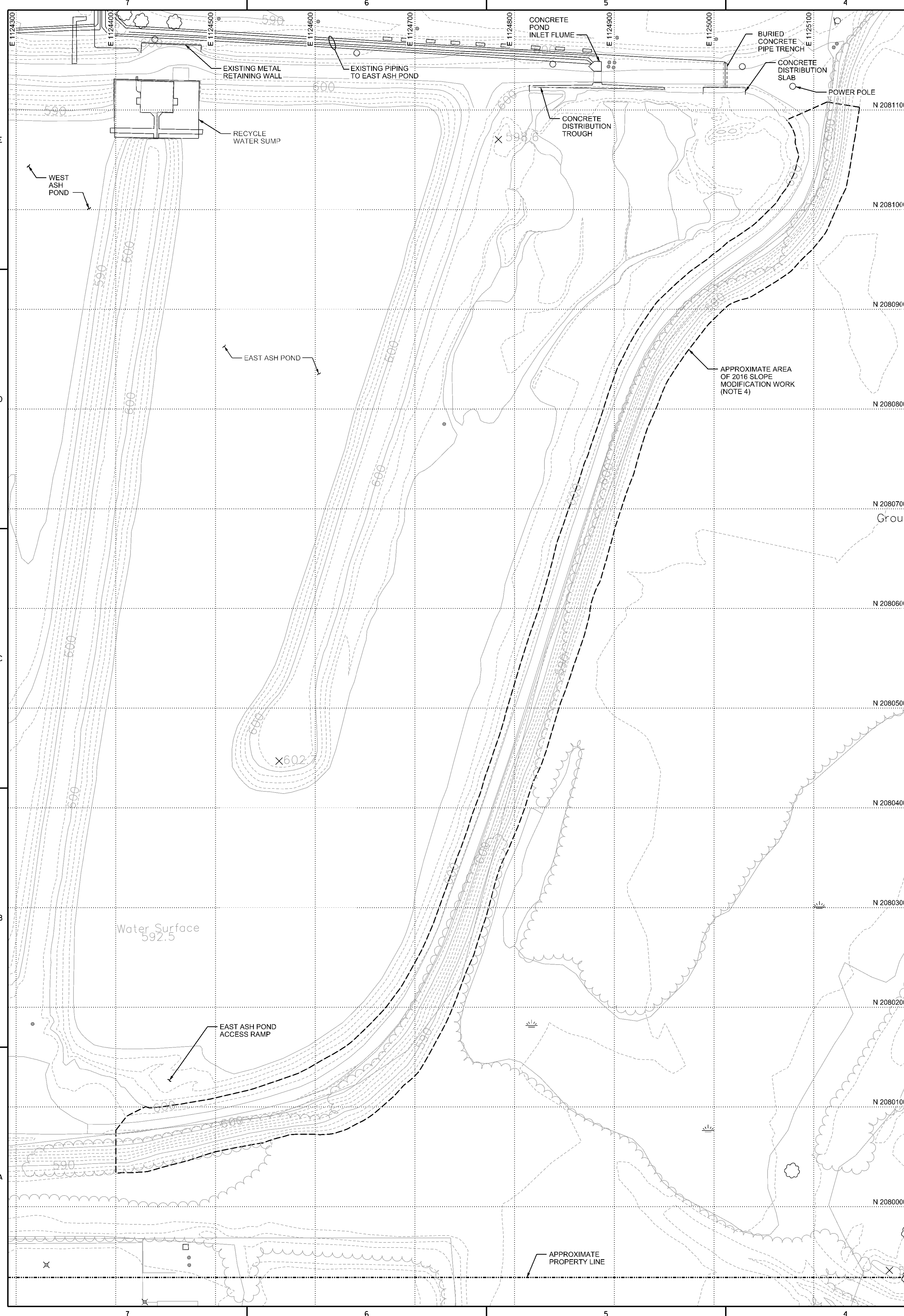
**2** TYPICAL FINAL COVER SYSTEM - ENGINEERED TURF  
16 NOT TO SCALE

NOT FOR CONSTRUCTION

<b>AECOM</b>	<b>DETAILS</b>		
	WAUKEGAN GENERATING STATION CLOSURE ALTERNATIVES ANALYSIS WAUKEGAN, ILLINOIS		
	FOR <b>ISSUED FOR REVIEW</b>		
SEAL	SCALE: AS SHOWN	DES: MR	
	DWG TYPE: DWG	DFTR: PK	
	JOB NO: 60669161	CHKD: RB	
	DATE: 11/15/2021	ENGR: JT	
FILENAME: DETAILS.DWG	APPD: JT		
DWG SIZE	DRAWING NO.	REVISION	
ANSI D 22.0"x34.0"	<b>14</b>	<b>A</b>	



**FOR PERMIT**  
NOT FOR CONSTRUCTION



HOLD INFORMATION	
NO.	DESCRIPTION

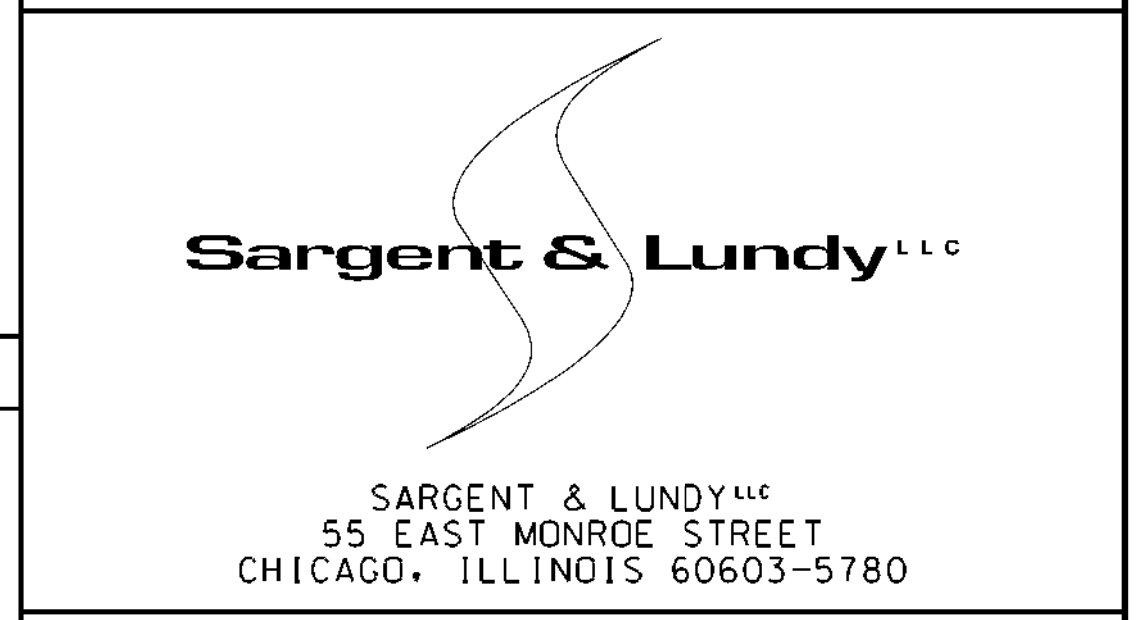
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.

RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
A	11-11-2021	FOR CLIENT COMMENT

ISSUE PURPOSE: CLIENT COMMENT  
SPECIFICATION: W-7900  
PROJECT NO.: 12661-098

CAD FILE NAME: WKG-AP-CSK-006.DGN  
PREPARED BY: J. CHAVEZ  
REVIEWED BY: T. DEHLIN / D. NIELSON  
APPROVED BY: --

ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.



- NOTES**
- ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED AND INSTALLED BY SPECIFICATION W-7900 UNLESS NOTED OTHERWISE.
  - FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS, SEE DRAWING WKG-AP-CSK-002.
  - EXISTING CONDITIONS FOR THE EAST ASH POND ARE BASED ON TOPOGRAPHIC DATA COLLECTED IN 2014. PRIOR TO BEGINNING ANY POND CLOSURE WORK, THE CONTRACTOR SHALL MAKE A TOPOGRAPHIC ASSESSMENT TO VERIFY THE ACCURACY OF THE EXISTING CONDITIONS SHOWN PER NOTE 10 ON DRAWING WKG-AP-CSK-002.
  - IN 2016, THE DOWNSTREAM SLOPE OF THE EAST ASH POND'S EAST DIKE WAS LOWERED TO AN APPROXIMATE CREST ELEVATION OF 600 FEET AND REGRADED TO A FLATTER GRADE THAN SHOWN. SEE GEOSYNTEC DRAWINGS SW0251-11-01 - 07 FOR THE 2016 SLOPE MODIFICATION DESIGN PLANS, SECTIONS, AND DETAILS.

**REFERENCE DRAWINGS**

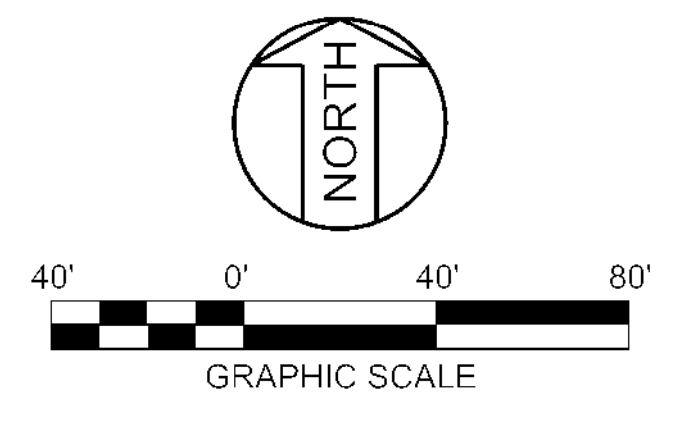
5082-C-5006	ASH POND DETAIL PLAN
5082-C-5007	ASH POND SECTIONS AND DETAILS
5082-C-5001	WASTE WATER TREATMENT FACILITIES ASH POND SUMP PLAN, SECTIONS AND DETAILS
5082-C-5502	ASH POND SUMP WEIR PLAN, SECTIONS & DETAILS
5082-C-5503	ASH POND SUMP AND WEIR MISCELLANEOUS SECTIONS AND DETAILS
5082-C-5507	ASH POND INLET FLUME & DISTRIBUTION TROUGH DETAILS
B739	EAST AND WEST ASH POND LINER REPLACEMENT PLANS, SECTIONS AND DETAILS
SW0251-11-01 - 07	EAST ASH BASIN SLOPE MODIFICATION

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.



**PROJECT**

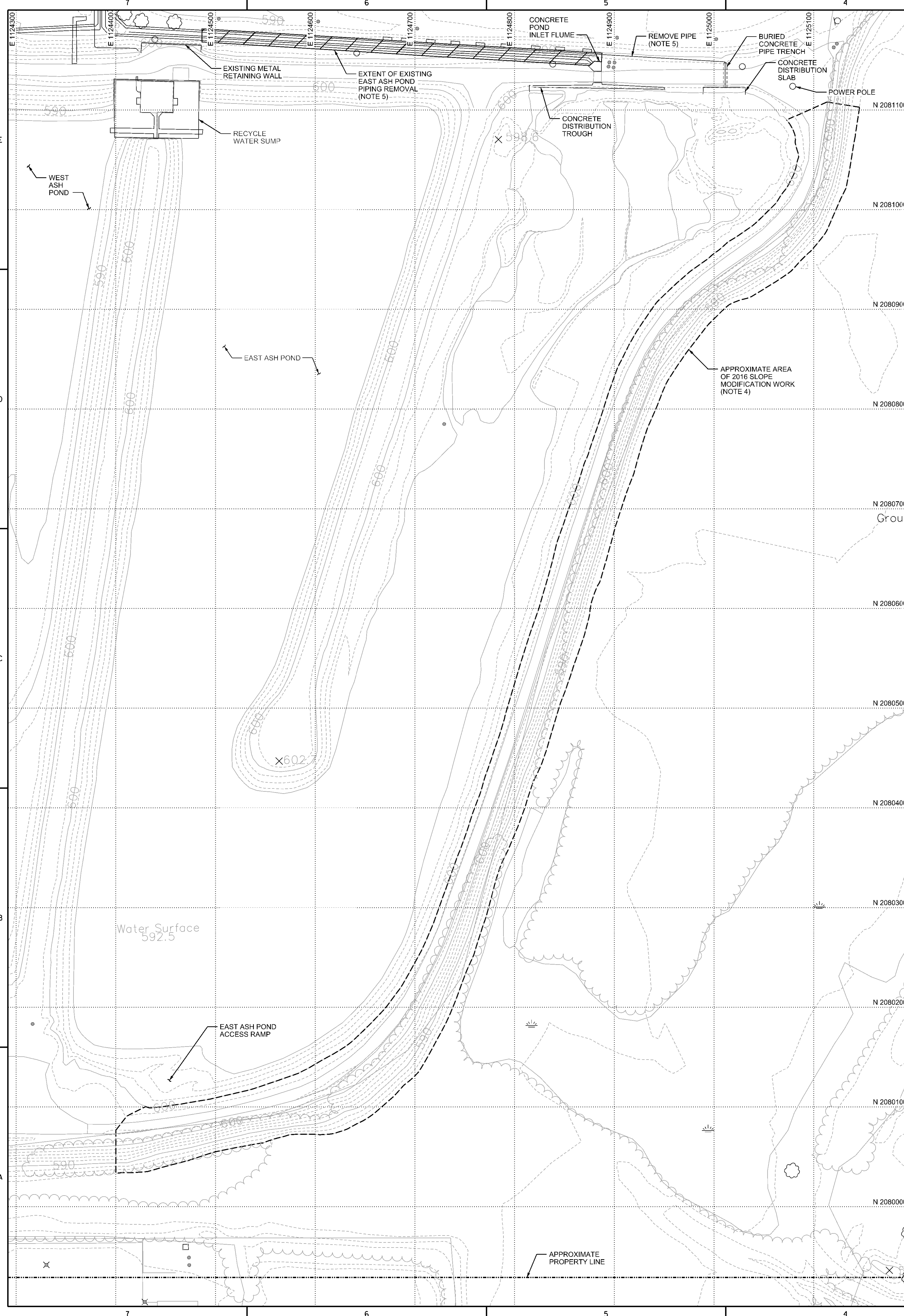
MIDWEST GENERATION, LLC  
WAUKEGAN  
GENERATING STATION  
ASH POND CLOSURE PROJECT

DRAWING TITLE	
EAST ASH POND EXISTING CONDITIONS	
DRAWING NUMBER	REVISION
WKG-AP-CSK-006	A
SHEET 1 OF 1	1

PL12797/041864/51#2-1  
Form 006-0401-01-06 - ANSI (Imperial) MicroStation Border - Size E - 34 x 44  
Revision 11A, Revision Date: 04-30-2010

11/11/2021 10:46:51 AM  
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**FOR PERMIT**  
NOT FOR CONSTRUCTION



HOLD INFORMATION	
NO.	DESCRIPTION

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.

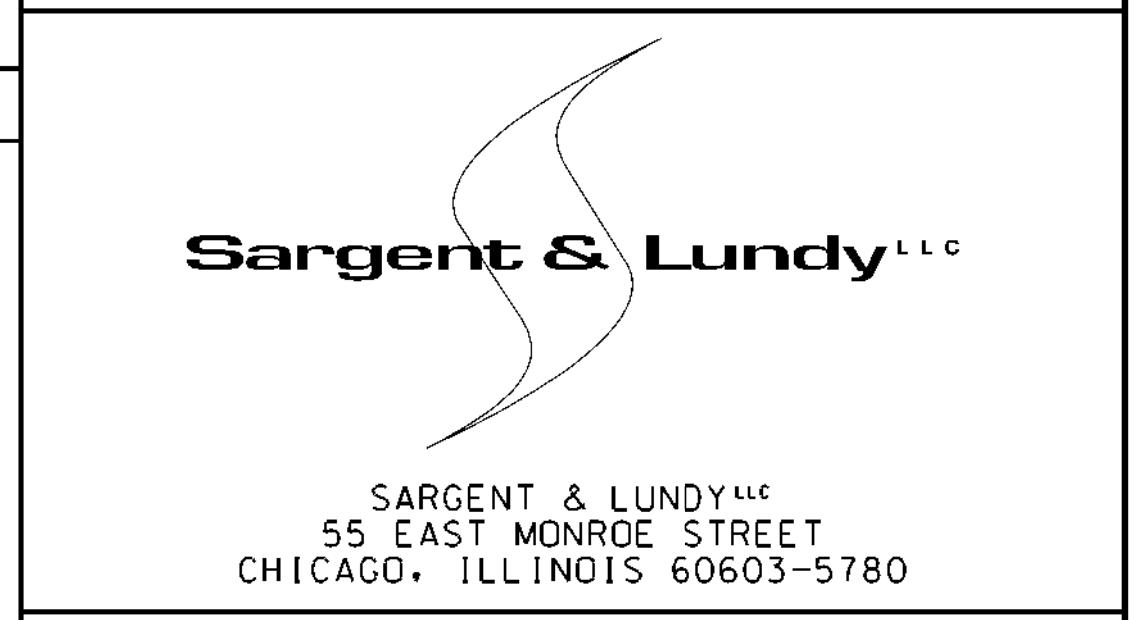
RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
A	11-11-2021	FOR CLIENT COMMENT

ISSUE PURPOSE: CLIENT COMMENT  
SPECIFICATION: W-7900

PROJECT NO.: 12661-098

CAD FILE NAME: WKG-AP-CSK-007.DGN  
PREPARED BY: J. CHAVEZ  
REVIEWED BY: T. DEHLIN / D. NIELSON  
APPROVED BY: --

ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.



- NOTES**
- ALL WORK SHOWN ON THIS DRAWING SHALL BE FURNISHED AND INSTALLED BY SPECIFICATION W-7900 UNLESS NOTED OTHERWISE.
  - FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS, SEE DRAWING WKG-AP-CSK-002.
  - EXISTING CONDITIONS FOR THE EAST ASH POND ARE BASED ON TOPOGRAPHIC DATA COLLECTED IN 2014. PRIOR TO BEGINNING ANY POND CLOSURE WORK, THE CONTRACTOR SHALL MAKE A TOPOGRAPHIC ASSESSMENT TO VERIFY THE ACCURACY OF THE EXISTING CONDITIONS SHOWN PER NOTE 10 ON DRAWING WKG-AP-CSK-002.
  - IN 2016, THE DOWNSTREAM SLOPE OF THE EAST ASH POND'S EAST DIKE WAS LOWERED TO AN APPROXIMATE CREST ELEVATION OF 600 FEET AND REGRADED TO A FLATTER GRADE THAN SHOWN. SEE GEOSYNTEC DRAWINGS SW0251-11-01 - 07 FOR THE 2016 SLOPE MODIFICATION DESIGN PLANS, SECTIONS, AND DETAILS.
  - DISCONNECT ALL PIPES FROM INLET FLUME, REMOVE PIPE SLEEVES, AND REMOVE PIPES TO LIMITS OF FINAL COVER SYSTEM SHOWN ON DRAWING WKG-AP-CSK-008. CAP ENDS OF PIPES REMAINING IN PLACE. PLACE REMOVED PIPE SLEEVES AND PIPE SECTIONS IN ONSITE STOCKPILE AREA DESIGNATED BY OWNER.

**REFERENCE DRAWINGS**

5082-C-5006	ASH POND DETAIL PLAN
5082-C-5007	ASH POND SECTIONS AND DETAILS
5082-C-5001	WASTE WATER TREATMENT FACILITIES ASH POND SUMP PLAN, SECTIONS AND DETAILS
5082-C-5502	ASH POND SUMP WEIR PLAN, SECTIONS & DETAILS
5082-C-5503	ASH POND SUMP AND WEIR MISCELLANEOUS SECTIONS AND DETAILS
5082-C-5507	ASH POND INLET FLUME & DISTRIBUTION TROUGH DETAILS
B739	EAST AND WEST ASH POND LINER REPLACEMENT PLANS, SECTIONS AND DETAILS
SW0251-11-01 - 07	EAST ASH BASIN SLOPE MODIFICATION

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR(S)) PERFORMING THE WORK.

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

**PROJECT**

MIDWEST GENERATION, LLC  
WAUKEGAN  
GENERATING STATION  
ASH POND CLOSURE PROJECT

DRAWING TITLE	
EAST ASH POND DEMOLITION & REMOVAL PLAN	
DRAWING NUMBER	REVISION
WKG-AP-CSK-007	A
SHEET 1 OF 1	

PL12793/0M1864/S1#2-1  
Form 006-0401-01-06 - ANSI (Imperial) MicroStation Border - Size E - 34 x 44  
Revision 11A, Revision Date: 04-30-2010

11/11/2021 1:42:15 PM  
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**FOR PERMIT**  
NOT FOR CONSTRUCTION

HOLD INFORMATION	
NO.	DESCRIPTION

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.

RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
A	11-11-2021	FOR CLIENT COMMENT

ISSUE PURPOSE: CLIENT COMMENT  
SPECIFICATION: W-7900  
PROJECT NO.: 12661-098

CAD FILE NAME: WKG-AP-CSK-008.DGN  
PREPARED BY: J. CHAVEZ  
REVIEWED BY: T. DEHLIN / D. NIELSON  
APPROVED BY: --

ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.

**Sargent & Lundy**  
SARGENT & LUNDY<sup>LLC</sup>  
55 EAST MONROE STREET  
CHICAGO, ILLINOIS 60603-5780

**MWG**  
Midwest Generation LLC

PROJECT  
MIDWEST GENERATION, LLC  
WAUKEGAN  
GENERATING STATION  
ASH POND CLOSURE PROJECT

DRAWING TITLE  
EAST ASH POND  
FINAL COVER SYSTEM  
GRADING PLAN

DRAWING NUMBER	REVISION
WKG-AP-CSK-008	A

SHEET 1 OF 1

The main site plan shows the layout of the East Ash Pond final cover system. It includes contour lines for major (10') and minor (2') elevations, ranging from 590 to 610. Key features include:
 

- LP SWALE** (Low Profile Swale) at N 2081027.40, E 1124429.29, EL. 602.00.
- HP SWALE** (High Profile Swale) at N 2080782.79, E 1124855.97, EL. 605.10.
- NEW LOW VOLUME WASTE POND** (CSK-004) and **RECYCLE WATER SLUMP**.
- EXISTING METAL RETAINING WALL** and **CAPPED EAST ASH POND PIPING** (CSK-007).
- LIMITS OF FINAL COVER SYSTEM** (DETAIL 1, CSK-009) and (DETAIL 3, CSK-009).
- LIMITS OF FINAL COVER SYSTEM** (DETAIL 4, CSK-009).
- APPROXIMATE PROPERTY LINE** shown at the bottom.
- POWER POLE** located near the top right.
- SECTION CUTS** A-A, B-B, and C-C are indicated with arrows.

**LEGEND**

- 610 MAJOR CONTOUR (10')
- 608 MINOR CONTOUR (2')
- DRAINAGE PATH

**NOTES**

- ALL WORK SHOWN ON THIS DRAWING SHALL BE PERFORMED IN ACCORDANCE WITH SPECIFICATION W-7900 UNLESS NOTED OTHERWISE.
- FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS, SEE DRAWING WKG-AP-CSK-002.
- INSTALL FINAL COVER SYSTEM OVER EAST ASH POND PER DETAIL 1 ON DRAWING WKG-AP-CSK-009.
- AT TOES OF EAST ASH POND DIKES, FINAL COVER SYSTEM COMPONENTS SHALL BE ANCHORED IN ANCHOR TRENCHES PER DETAIL 2 ON DRAWING WKG-AP-CSK-009.

**REFERENCE DRAWINGS**

B739	EAST AND WEST ASH POND LINER REPLACEMENT PLANS, SECTIONS AND DETAILS
CSK-004	WEST ASH POND EXCAVATION PLAN
CSK-009	EAST ASH POND FINAL COVER SYSTEM SECTIONS & DETAILS

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

**GRAPHIC SCALE**

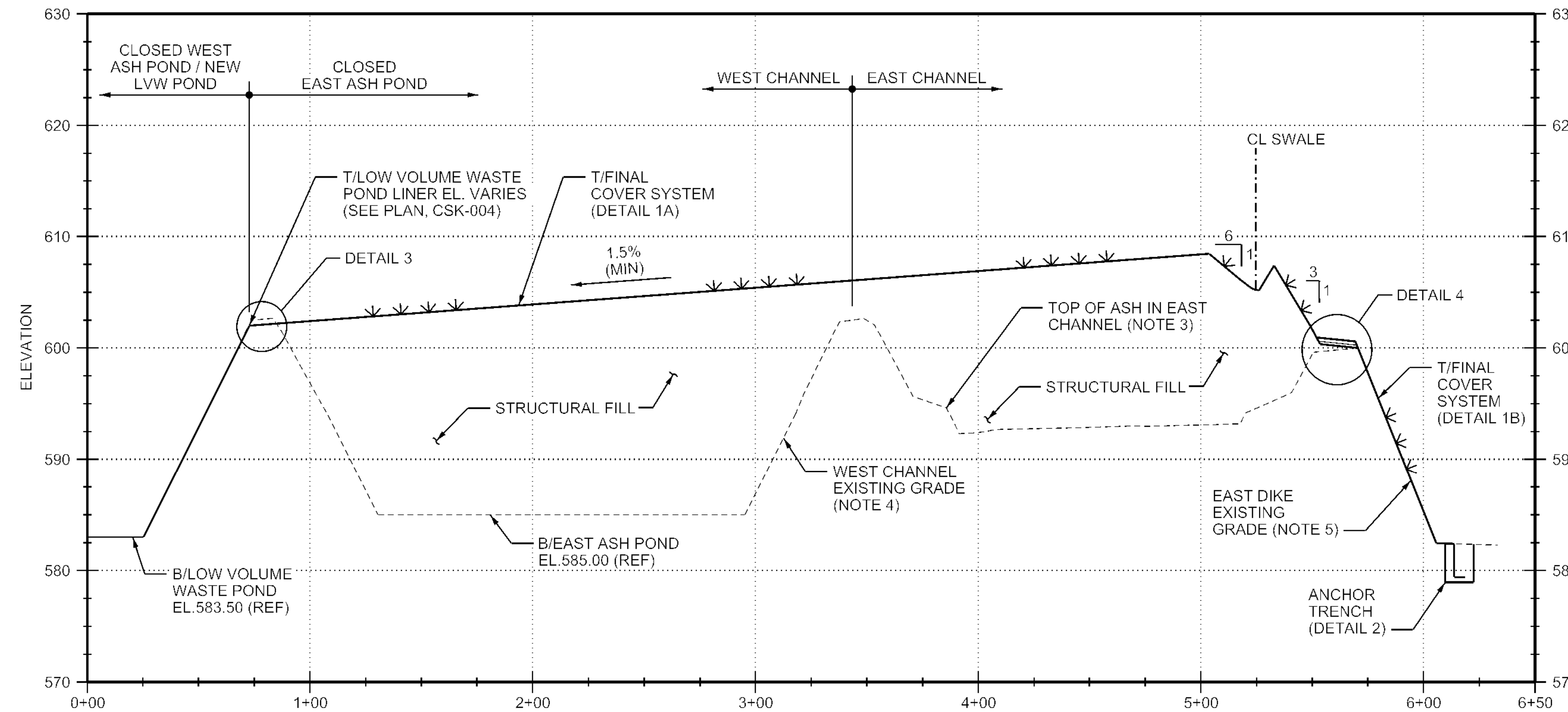
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**NORTH**

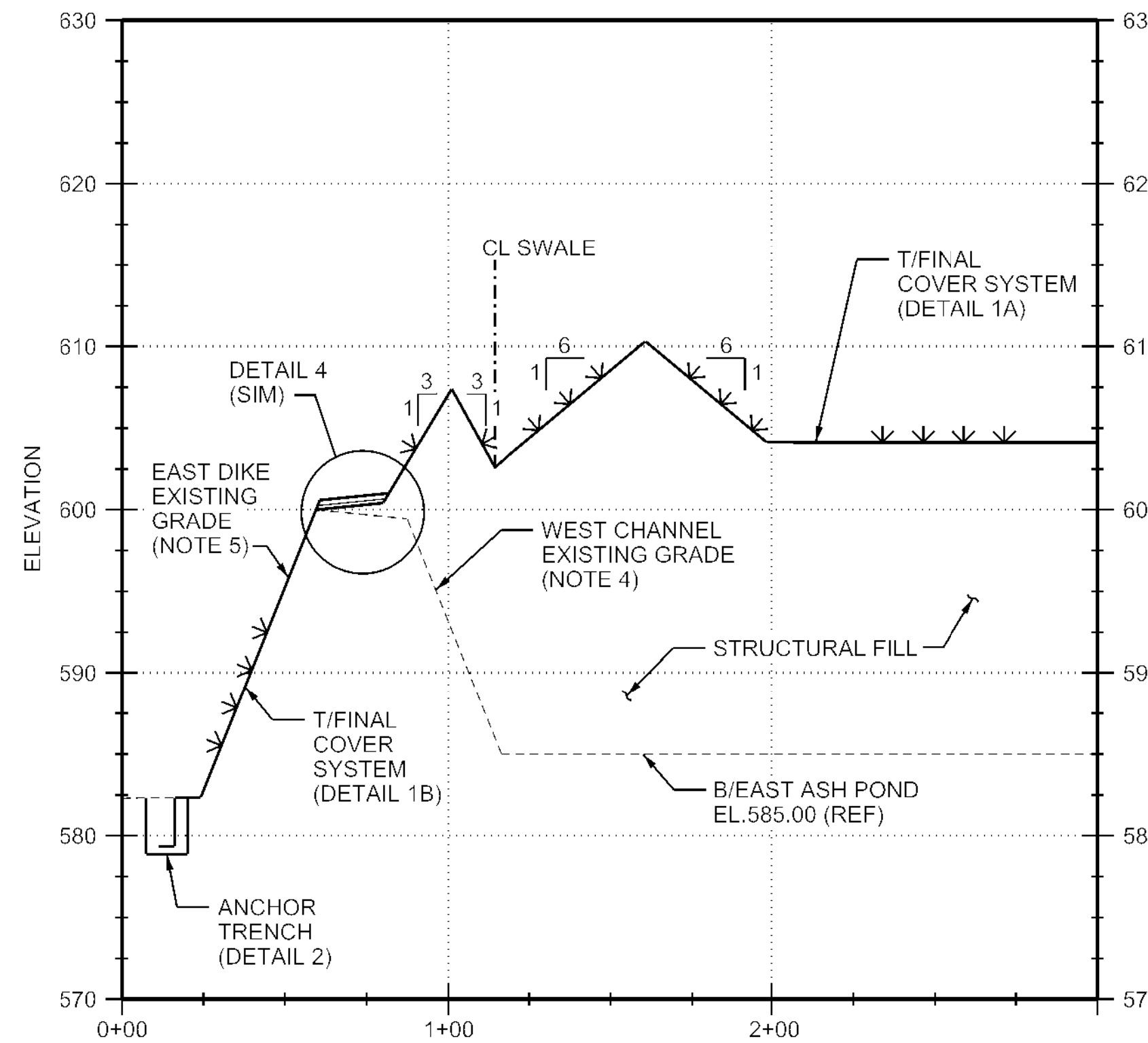
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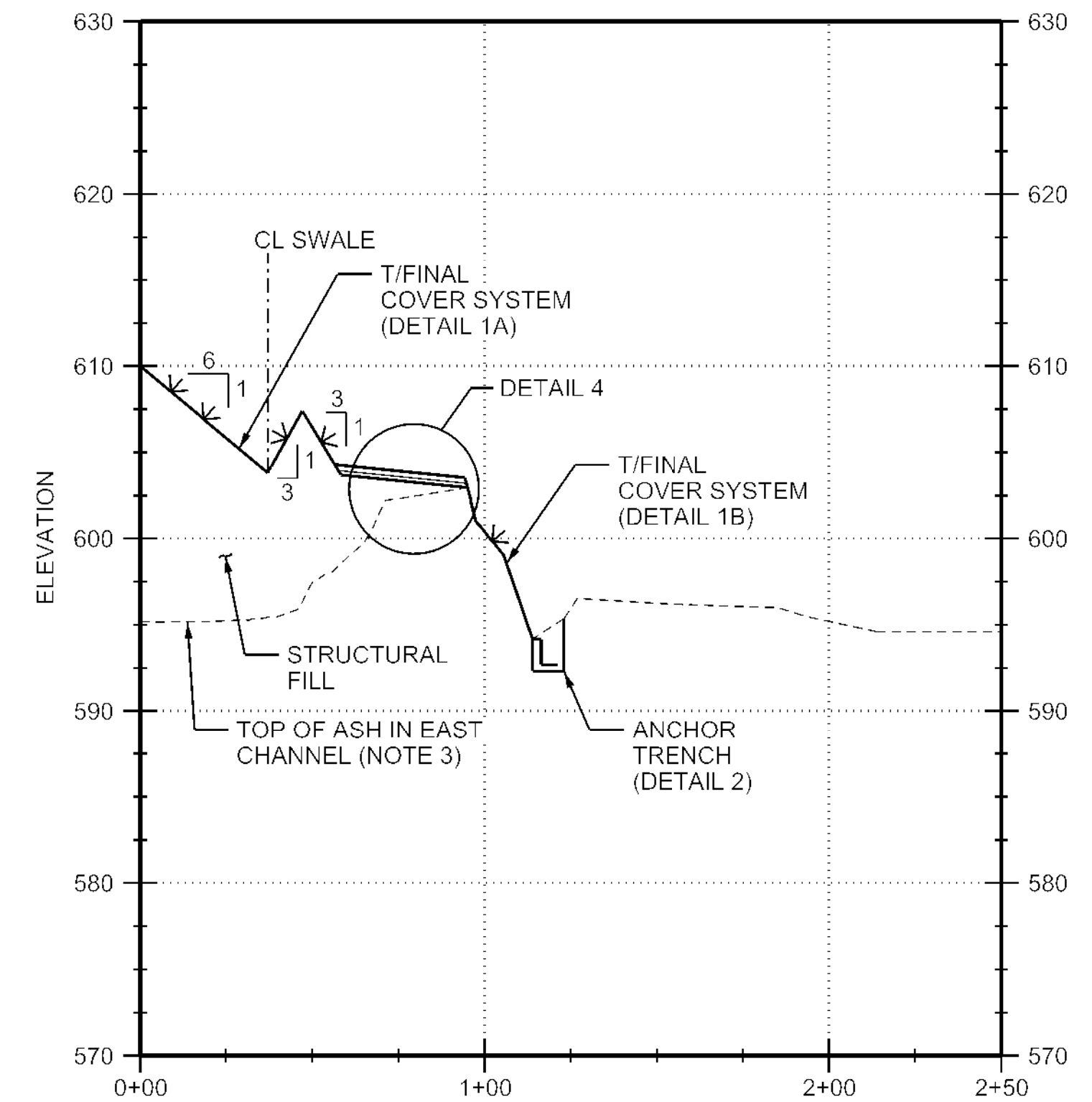




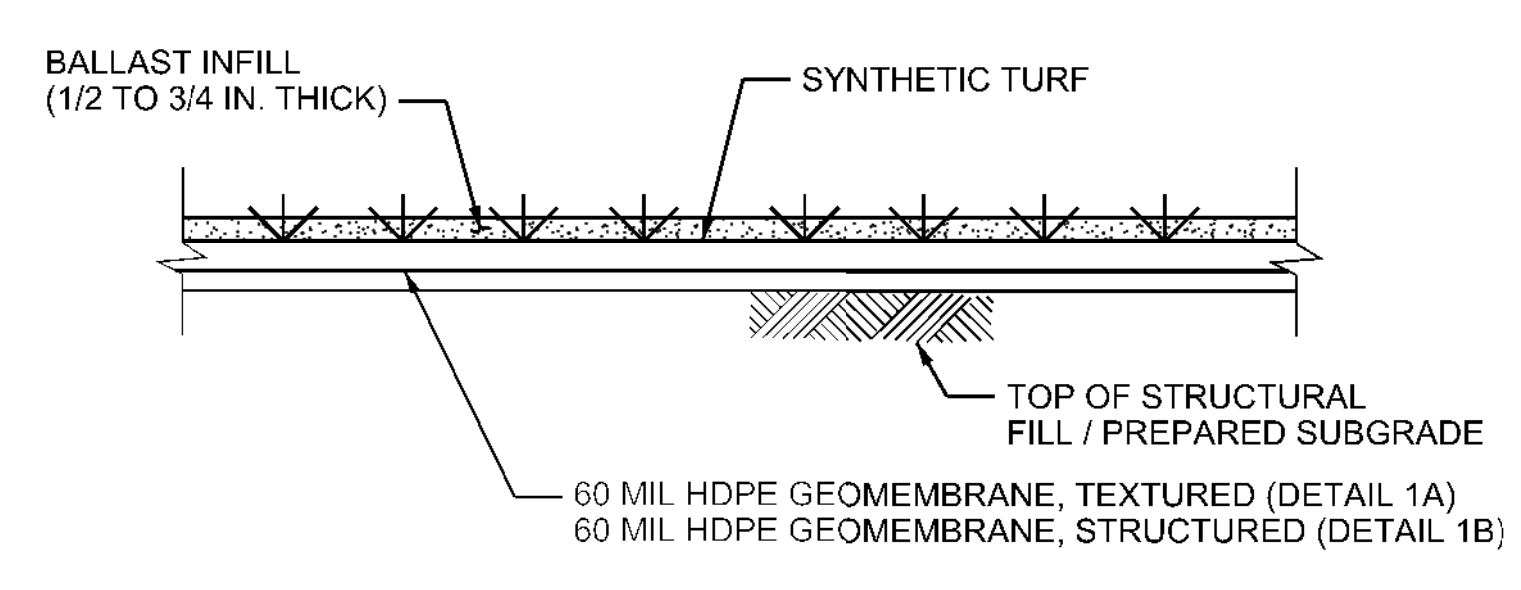
**SECTION A**  
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VERTICAL SCALE 1"=5'  
(CSK-008)



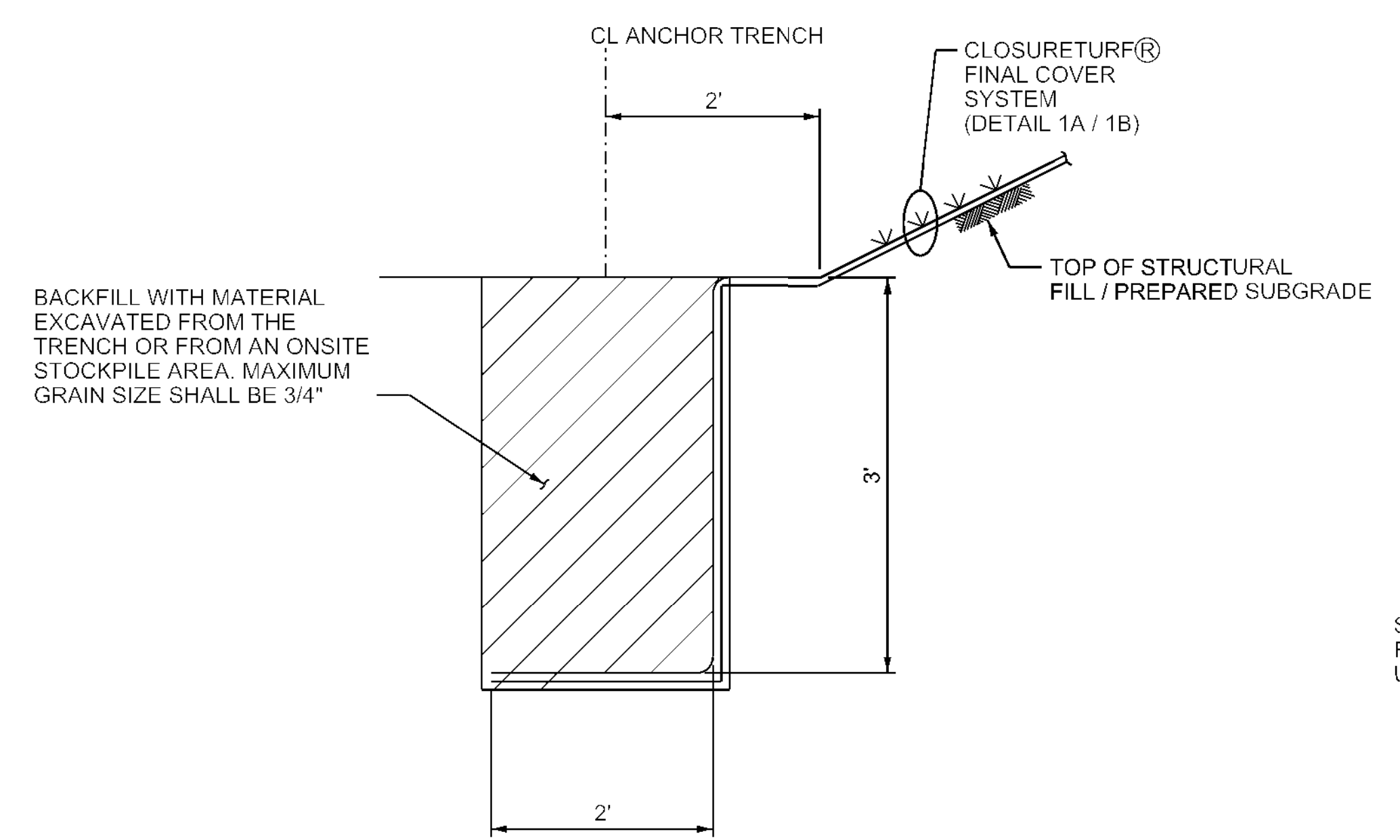
**SECTION B**  
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VERTICAL SCALE 1"=5'  
(CSK-008)



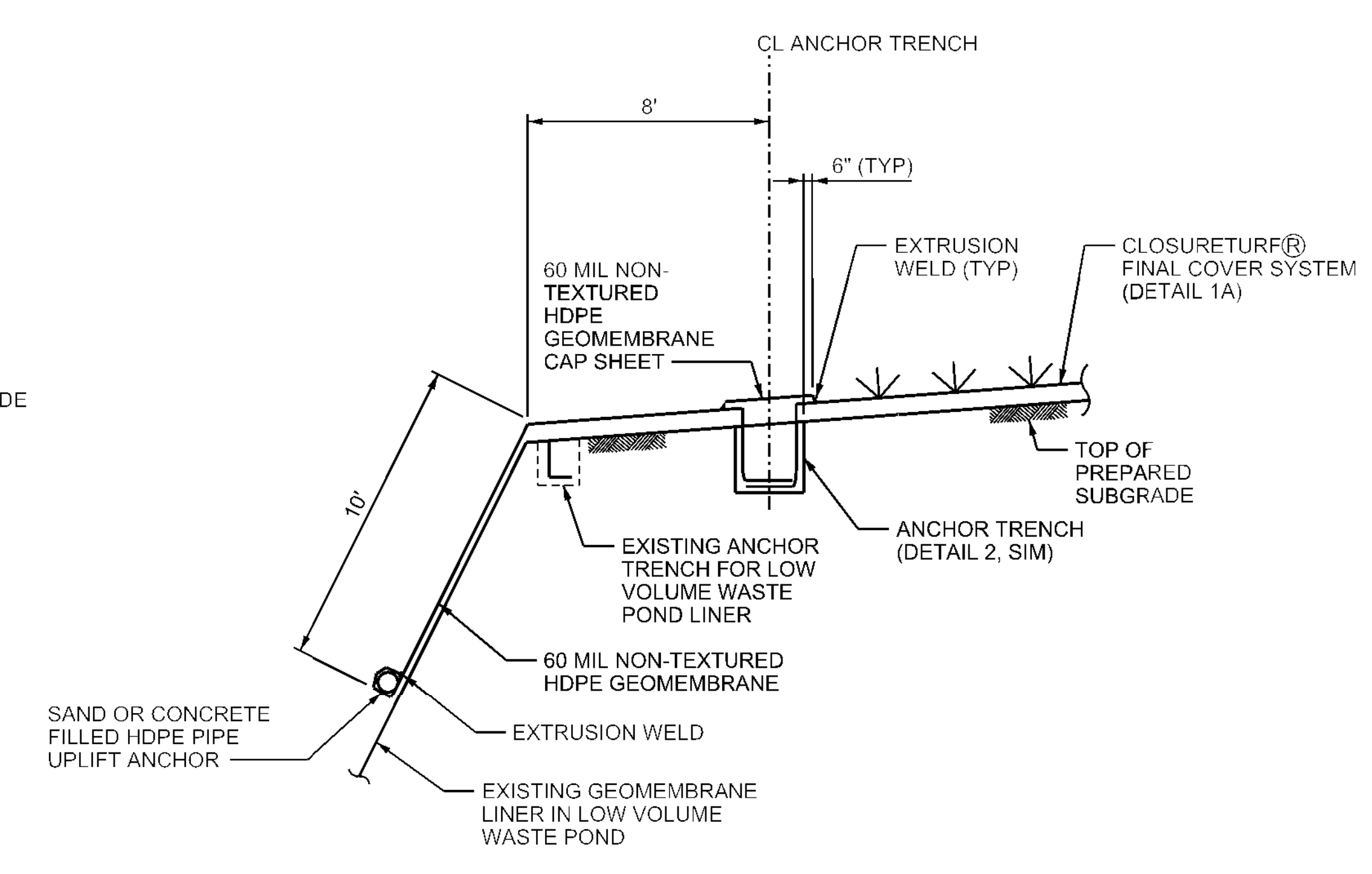
**SECTION C**  
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VERTICAL SCALE 1"=5'  
(CSK-008)



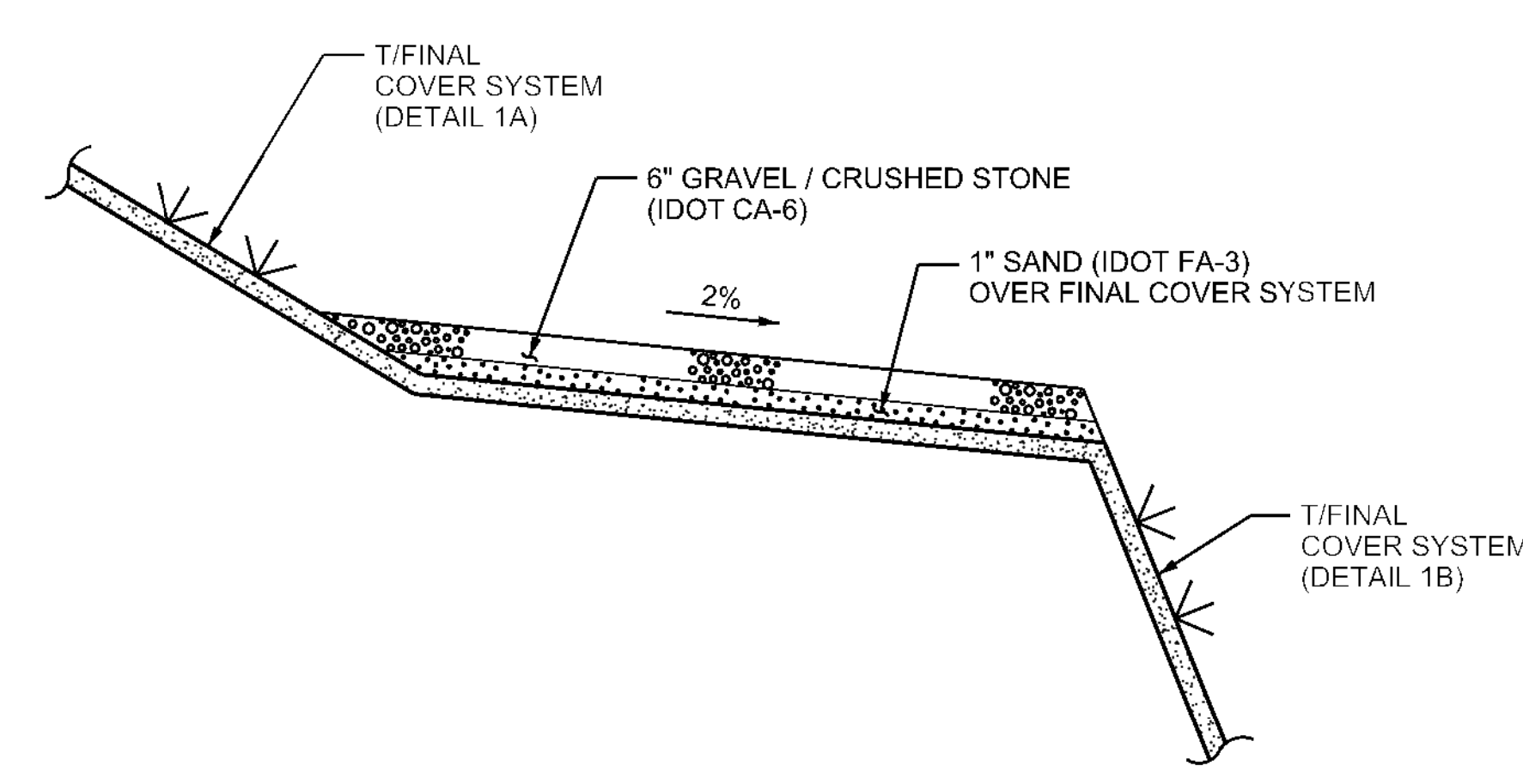
**CLOSURETURF@  
FINAL COVER SYSTEM  
DETAIL 1**  
N.T.S.



**TYPICAL ANCHOR TRENCH  
DETAIL 2**  
N.T.S.



**GEOMEMBRANE LINER TRANSITION AT  
NEW LOW VOLUME WASTE POND  
DETAIL 3**  
N.T.S.



**FINAL COVER ACCESS ROAD  
DETAIL 4**  
N.T.S.

- NOTES**
- ALL WORK SHOWN ON THIS DRAWING SHALL BE PERFORMED IN ACCORDANCE WITH SPECIFICATION W-7900 UNLESS NOTED OTHERWISE.
  - FOR GENERAL NOTES, ABBREVIATIONS, AND SYMBOLS. SEE DRAWING WKG-AP-CSK-002.
  - TOP-OF-ASH SURFACE SHOWN IN THE EAST CHANNEL REPRESENTS THE ASH STORED IN THE POND DURING THE 2014 SURVEY OF THE SITE AND MAY NOT BE REPRESENTATIVE OF CURRENT CONDITIONS.
  - EXISTING GRADE SHOWN IN THE WEST CHANNEL REPRESENTS THE FLOOR AND SIDE SURFACES OF THE WEST CHANNEL THAT ARE ASSUMED TO HAVE BEEN INSTALLED BASED ON THE EAST ASH POND'S HISTORY OF CONSTRUCTION (GEOSYNTEC, 2016).
  - EXISTING GRADE SHOWN FOR THE DOWNSTREAM SLOPE OF THE EAST ASH POND'S EAST DIKE REPRESENTS THE SIDE SURFACE ASSUMED TO HAVE BEEN INSTALLED IN ACCORDANCE WITH THE SLOPE MODIFICATION WORK DONE IN 2016 (REF. DWGS. SW0251-11-01 THROUGH -07).

**REFERENCE DRAWINGS**

B739	EAST AND WEST ASH POND LINER REPLACEMENT PLANS, SECTIONS AND DETAILS
CSK-008	EAST ASH POND FINAL COVER SYSTEM GRADING PLAN
SW0251-11-01-07	EAST ASH BASIN SLOPE MODIFICATION

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUBCONTRACTOR(S)) PERFORMING THE WORK.

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

**FOR PERMIT  
NOT FOR CONSTRUCTION**

**HOLD INFORMATION**

NO.	DESCRIPTION

CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.

**RELEASE INFORMATION**

REV.	DATE	DESCRIPTION
A	11-11-2021	FOR CLIENT COMMENT

**ISSUE PURPOSE: CLIENT COMMENT**

**SPECIFICATION: W-7900**

**PROJECT NO.: 12661-098**

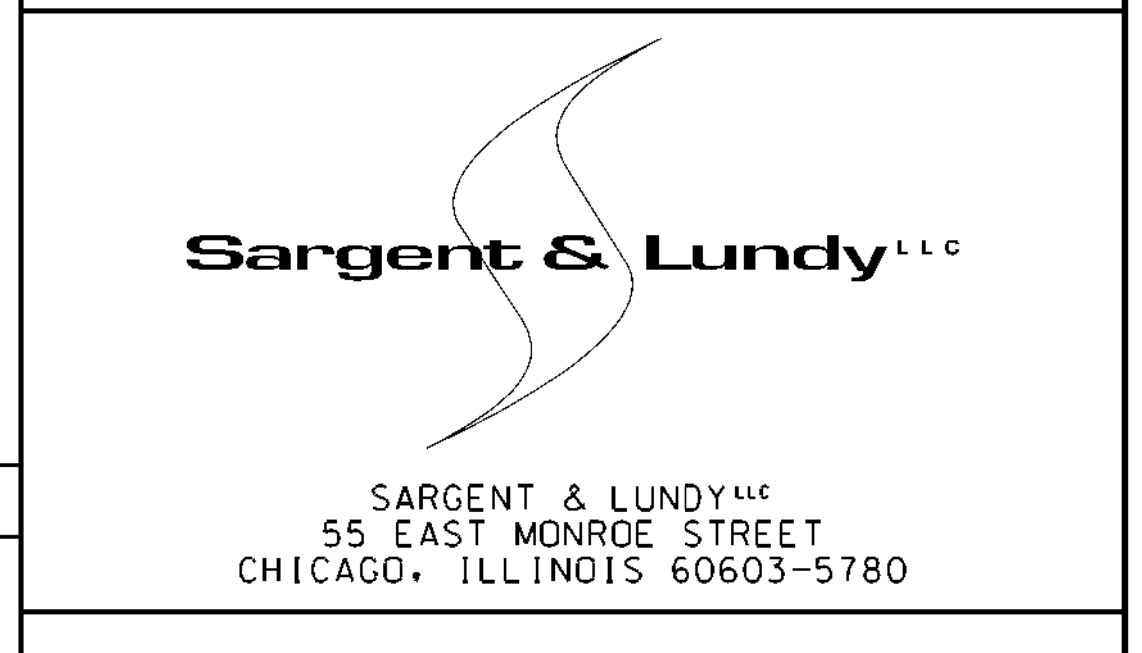
**CAD FILE NAME: WKG-AP-CSK-009.DGN**

**PREPARED BY: J. CHAVEZ**

**REVIEWED BY: T. DEHLIN / D. NIELSON**

**APPROVED BY: --**

ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.



**PROJECT**

**MIDWEST GENERATION, LLC  
WAUKEGAN  
GENERATING STATION  
ASH POND CLOSURE PROJECT**

**DRAWING TITLE**

**EAST ASH POND  
FINAL COVER SYSTEM  
SECTIONS & DETAILS**


DRAWING NUMBER	REVISION
WKG-AP-CSK-009	A

**SHEET 1 OF 1**


PL12793/0M1864/S1#2-1  
Form 000-0401-01-06 - ANSI (Imperial) MicroStation Border - Size E - 34 x 44  
Revision 11A, Revision Date: 04-30-2010

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**ATTACHMENT B**

 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG Waukegan</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-by-Removal	SHEET: Cost Summary	REV. NO.: A
	SUBJECT: <b>Preliminary Project Costs Sheets</b>	IMPOUNDMENT NAME: West Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: <b>Cost Summary: Close-by-Removal Cost Estimate for CCR Impoundment</b>	CLOSURE OPTION: West - Closure-by-Removal	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/4/2021	REVIEWED BY: Rob Boeing

<b>Waukegan West Ash Basin: Closure by Removal Closure &amp; Post-Closure Cost Summary</b>	
Close-by-Removal Tasks	Cost (2021 Dollars)
Mobilization / Site Prep / Demobilization	\$1,247,924
Achieve Closure-by-Removal / Convey Material	\$7,245,000
Stormwater Management / E&S Controls / Site Restoration	\$294,135
Contingency (25%)	\$2,196,765
Engineering Support (Design & CQA)	\$5,000,000
<b>Total Closure Cost of CCR Impoundment =</b>	<b>\$15,983,824</b>
Post-Closure Tasks	Cost (2021 Dollars)
Groundwater Monitoring	\$150,000
Operations & Maintenance (O&M)	\$0
Contingency (25%)	\$37,500
Engineering Costs (10%)	\$18,750
<b>Total Post-Closure of CCR Impoundment =</b>	<b>\$206,250</b>
<b>Total Closure &amp; Post-Closure of CCR Impoundment Cost =</b>	<b>\$16,190,074</b>

 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG Waukegan</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-by-Removal	SHEET: Closure-by-Removal Costs	REV. NO.: A
	SUBJECT: <b>Preliminary Project Costs Sheets</b>	IMPOUNDMENT NAME: West Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: <b>Close-by-Removal Costs: Closure-by-Removal Cost Estimate for CCR Impoundment</b>	CLOSURE OPTION: West - Closure-by-Removal	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/04/21	REVIEWED BY: Rob Boeing


BASIS OF THE ESTIMATE			
YEAR COST BASIS	2021	AREA OF OPEN FREE WATER IN IMPOUNDMENT (AC)	6
TOTAL AREA TO BE RESTORED (AC)	11	AVG. DEPTH OF FREE WATER (FT)	2
TOTAL CLOSURE-BY-REMOVAL AREA (AC)	11	VOLUME OF FREE WATER IN IMPOUNDMENT (GAL)	3,910,000
VOLUME OF ASH IN CLOSURE-BY-REMOVAL AREA (CY)	93,000	PERIMETER OF CLOSURE-BY-REMOVAL AREA (L.F.)	3,000

CLOSE-BY-REMOVAL ESTIMATED COSTS							
TASK	ITEM	UNIT	QUANTITY	INSTALLED UNIT COST	IMPOUNDMENT CLOSURE COST	NOTES	
<b>MOBILIZATION / SITE PREP / DEMOBILIZATION</b>							
MOBILIZATION / SITE PREP / DEMOBILIZATION	1	MOBILIZATION / DEMOBILIZATION	LS	1	\$97,924	\$97,924	Mob/Demob & insurance: (1% of Total EPC Bid Price) includes administration (mtgs, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup).
	2	MODIFICATIONS OF OUTLET STRUCTURES / PIPING	LS	1	\$250,000	\$250,000	Assume outlet structures and piping will be modified.
	3	REMOVAL & FILTRATION OF FREE WATER	MONTHS	9	\$100,000	\$900,000	Based on Initiation time
<b>ACHIEVE CLOSURE-BY-REMOVAL / CONVEY MATERIAL</b>							
ACHIEVE CLOSURE BY-REMOVAL / CONVEY MATERIAL	4	REMOVAL & TREATMENT OF PORE WATER WITHIN ASH	MONTHS	12	\$100,000	\$1,200,000	STEP 1: Start dewatering for Construction time. Based on Construction Time.
	5	EXCAVATE ASH FOR CLOSURE-BY-REMOVAL / STOCKPILE ASH	CY	93,000	\$8.00	\$744,000	Step 2: Assume CCR material must be stockpiled within impoundment area to decant prior to loading. Done in conjunction with Step 1. Decant water collected and treated along with pore water from Step 1.
	8	EXCAVATE / LOAD / HAUL CCR MATERIAL (OFF-SITE LF)	CY	93,000	\$57.00	\$5,301,000	Assume disposal of CCRs at an off-site landfill (assume density of 1.2 tons/cy).
<b>STORMWATER MANAGEMENT / E&amp;S CONTROLS / SITE RESTORATION</b>							
STORMWATER MANAGEMENT / E&S CONTROLS / SITE RESTORATION	9	SITE EROSION AND SEDIMENT CONTROL	ACRE	11	\$2,000	\$22,000	Assume total area to be restored will require site erosion and sediment control.
	10	TOPSOIL	CY	17,746	\$13.00	\$230,698	Assume 12 inches of top soil needed (obtained off-site) to establish vegetative stabilization over total closed-by-removal area and not covered by the Industrial Landfill
	11	SEED / FERTILIZE / MULCH	ACRE	11	\$3,767.00	\$41,437	Assume total area of disturbance will be mulched, fertilized, and seeded.

 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG Waukegan</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-by-Removal	SHEET: Closure-by-Removal Costs	REV. NO.: A
	SUBJECT: <b>Preliminary Project Costs Sheets</b>	IMPOUNDMENT NAME: West Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: <b>Close-by-Removal Costs: Closure-by-Removal Cost Estimate for CCR Impoundment</b>	CLOSURE OPTION: West - Closure-by-Removal	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/04/21	REVIEWED BY: Rob Boeing


BASIS OF THE ESTIMATE			
YEAR COST BASIS	2021	AREA OF OPEN FREE WATER IN IMPOUNDMENT (AC)	6
TOTAL AREA TO BE RESTORED (AC)	11	AVG. DEPTH OF FREE WATER (FT)	2
TOTAL CLOSURE-BY-REMOVAL AREA (AC)	11	VOLUME OF FREE WATER IN IMPOUNDMENT (GAL)	3,910,000
VOLUME OF ASH IN CLOSURE-BY-REMOVAL AREA (CY)	93,000	PERIMETER OF CLOSURE-BY-REMOVAL AREA (L.F.)	3,000

CLOSE-BY-REMOVAL ESTIMATED COSTS							
TASK	ITEM	UNIT	QUANTITY	INSTALLED UNIT COST	IMPOUNDMENT CLOSURE COST	NOTES	
<b>CONTINGENCY / ENGINEERING SUPPORT</b>							
CONTINGENCY / ENGINEERING SUPPORT	12	CONTINGENCY (25%)	LS	1	\$2,196,765	\$2,196,765	
	13	ENGINEERING SUPPORT (DESIGN AND CQA 10%)	LS	1	\$1,103,253	\$1,103,253	
<b>POST-CLOSURE</b>							
POST-CLOSURE	14	GROUNDWATER MONITORING	ANNUAL	3	\$50,000	\$150,000	Annual groundwater monitoring costs for each CCR impoundment are based on current groundwater monitoring system.
	15	OPERATIONS & MAINTENANCE (O&M)	ANNUAL	0	\$27,500	\$0	Annual O&M costs are \$2500/acre/yr (includes leachate collection system maintenance). Based on Q3 2018 Post Closure Maintenance data.
<b>CONTINGENCY / ENGINEERING COST</b>							
POST CLOSURE CONTINGENCY / ENGINEERING COST	16	CONTINGENCY (25%)	LS	1	\$37,500	\$37,500	
	17	ENGINEERING COST (10%)	LS	1	\$18,750	\$18,750	
	<b>TOTAL</b>					<b>\$12,293,327</b>	


 CALCULATION SHEET	PROJECT <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG Waukegan</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-by-Removal	SHEET Close-by-Removal Assumptions	REV. NO. A
	SUBJECT <b>Preliminary Project Costs Sheets</b>	IMPOUNDMENT NAME: West Ash Basin			AECOM JOB NO. 60669161
	ACTIVITY <b>Close-by-Removal Assumptions</b>	CLOSURE OPTION: West - Closure-by-Removal	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/04/21	REVIEWED BY: Rob Boeing

**KEY ASSUMPTIONS**

<b>The following key assumptions and limitations are associated with the project design, implementation and performance:</b>	
1	The cost estimates were prepared using 2021 dollars and do not include any escalation.
2	A 25% contingency has been included for this cost estimate.
3	Engineering design and CQA cost has been included for this cost estimate based on reasonable assumptions.
4	Interstitial water treatment was assumed to continue until construction is completed.
5	Assumed all CCR material excavated must be stockpiled in close proximity to the impoundment to be decanted. After decanting, the material will be excavated, loaded, and hauled off-site for disposal.
6	Groundwater monitoring costs are for a reduced groundwater network system as compared to the existing system. Groundwater monitoring costs do not include costs incurred for any additional well installation. Maintenance costs for wells are included in post-closure O&M costs.
7	O&M costs include, but are not limited to, the maintenance/repair of the groundwater monitoring system and general maintenance of the former CCR impoundment area.
8	Statements of Probable Construction Cost prepared by AECOM represent AECOM's judgment as a design professional familiar with the construction industry. It is recognized, however, that neither AECOM nor the Owner has control over the cost of labor, materials or equipment nor over the contractor's methods of determining the bid price or other competitive bidding, market, or negotiating conditions. Accordingly, AECOM cannot and does not warrant or represent that proposals, bids or actual construction costs will not vary from any statement of Probable Construction Cost or other estimates or evaluations prepared by AECOM.

 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-in-Place	SHEET: Cost Summary	REV. NO.: A
	SUBJECT: <b>Preliminary Project Costs Sheets</b>	IMPOUNDMENT NAME: West Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: <b>Cost Summary: Close-in-Place Cost Estimate for CCR Impoundment</b>	CLOSURE OPTION: Close-in-Place	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/4/2021	REVIEWED BY: Rob Boeing


<b>Waukegan West Ash Basin: Close-in-Place Closure &amp; Post-Closure Cost Summary</b>	
Close-in-Place Tasks	Cost (2021 Dollars)
Mobilization / Site Prep	\$1,242,064
Dewatering / Earthwork / Subgrade Prep.	\$2,348,700
Closure System Construction	\$1,158,751
Stormwater Management / E&S Controls / Site Restoration	\$3,513,737
Contingency (25%)	\$2,065,813
Engineering Support (Design & CQA)	\$2,900,000
<b>Total Closure Cost of CCR Impoundment =</b>	<b>\$13,229,065</b>
Post-Closure Tasks	Cost (2021 Dollars)
Groundwater Monitoring	\$1,500,000
Operations & Maintenance (O&M)	\$825,000
Contingency (25%)	\$581,250
Engineering Costs (10%)	\$290,625
<b>Total Post-Closure of CCR Impoundment =</b>	<b>\$3,196,875</b>
<b>Total Closure &amp; Post-Closure of CCR Impoundment Cost = \$16,425,940</b>	

 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Close-in-Place	SHEET: Close-in-Place Costs	REV. NO.: A
	SUBJECT: Preliminary Project Costs Sheets	IMPOUNDMENT NAME: West Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: Cost Summary: Close-in-Place Cost Estimate for CCR Impoundment	CLOSURE OPTION: Close-in-Place	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/04/21	REVIEWED BY: Rob Boeing

BASIS OF THE ESTIMATE				
YEAR COST BASIS	2021		AREA OF OPEN FREE WATER IN IMPOUNDMENT (AC)	3
TOTAL AREA TO BE RESTORED (AC)	11		AVG. DEPTH OF FREE WATER (FT)	2
TOTAL IMPOUNDMENT AREA (AC)	11		VOLUME OF FREE WATER IN IMPOUNDMENT (GAL)	3,910,000
VOLUME OF ASH IN IMPOUNDMENT (CY)	93,000		PERIMETER OF IMPOUNDMENT (L.F.)	3,100

CLOSE-IN-PLACE ESTIMATED COSTS							
TASK	ITEM	UNIT	QUANTITY	INSTALLED UNIT COST	IMPOUNDMENT CLOSURE COST	NOTES	
<b>MOBILIZATION / SITE PREP</b>							
MOBILIZATION / SITE PREP	1	MOBILIZATION	LS	1	\$92,064	\$92,064	Mob/Demob & insurance: (1% of Total EPC Bid Price includes administration (mtgs, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup).
	2	MODIFY OUTLET STRUCTURES / PIPING	LS	1	\$250,000	\$250,000	Final existing outlet structures and piping.
	3	REMOVAL & FILTRATION OF FREE WATER	MONTHS	9	\$100,000	\$900,000	
<b>DEWATERING / EARTHWORK / SUBGRADE PREP</b>							
DEWATERING / EARTHWORK / SUBGRADE PREP	4	REMOVAL & TREATMENT OF PORE WATER WITHIN ASH	MONTHS	12	\$100,000	\$1,200,000	Based on Construction Time
	5	ASH REGRADING TO ESTABLISH CROWN	CY	117,000	\$9.50	\$1,111,500	Quantity of earthwork (cut-to-fill) using existing ash to achieve positive slope prior to installation of closure system. Quantity calculated using AutoCAD.
	6	PERIMETER DITCH / TEMP. DIVERSION BERM GRADING	L.F.	3,100	\$12.00	\$37,200	Linear feet around the perimeter of impoundment.
	7	CONTACT STORM WATER TREATMENT	GAL				
<b>CLOSURE SYSTEM CONSTRUCTION</b>							
CLOSURE SYSTEM CONSTRUCTION	8	24" FINAL COVER SOIL	CY	35,493	\$11.00	\$390,427	24 inches of common soil placed over close-in-place area (assume on-site soils available)
	9	12" TOPSOIL	CY	17,747	\$13.00	\$230,707	12 inches of topsoil (obtained off-site) placed over closure-by-removal area.
	10	FLEXIBLE MEMBRANE LINER (FML)	SQ. FT.	527,076	\$0.42	\$221,372	Alternate Cap System Only: Flexible membrane liner placed over close-in-place area. Assume quantity needed is 10% more than close-in-place area.
	11	GEOCOMPOSITE DRAINAGE LAYER	SQ. FT.	527,076	\$0.60	\$316,246	Alternate Cap System Only: Geocomposite drainage layer placed over close-in-place area. Assume quantity needed is 10% more than close-in-place area.



 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Close-in-Place	SHEET: Close-in-Place Costs	REV. NO.: A
	SUBJECT: Preliminary Project Costs Sheets	IMPOUNDMENT NAME: West Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: Cost Summary: Close-in-Place Cost Estimate for CCR Impoundment	CLOSURE OPTION: Close-in-Place	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/04/21	REVIEWED BY: Rob Boeing

BASIS OF THE ESTIMATE				
YEAR COST BASIS	2021		AREA OF OPEN FREE WATER IN IMPOUNDMENT (AC)	3
TOTAL AREA TO BE RESTORED (AC)	11		AVG. DEPTH OF FREE WATER (FT)	2
TOTAL IMPOUNDMENT AREA (AC)	11		VOLUME OF FREE WATER IN IMPOUNDMENT (GAL)	3,910,000
VOLUME OF ASH IN IMPOUNDMENT (CY)	93,000		PERIMETER OF IMPOUNDMENT (L.F.)	3,100


CLOSE-IN-PLACE ESTIMATED COSTS							
TASK	ITEM	UNIT	QUANTITY	INSTALLED UNIT COST	IMPOUNDMENT CLOSURE COST	NOTES	
	<b>STORMWATER MANAGEMENT / E&amp;S CONTROLS / SITE RESTORATION</b>						
STORMWATER MANAGEMENT / E&S CONTROLS / SITE RESTORATION	12	SITE EROSION AND SEDIMENT CONTROL	ACRE	11	\$2,000	\$22,000	Assume total area to be restored will require site erosion and sediment control.
	13	STORMWATER MANAGEMENT / CHANNELS / LET-DOWNS	L.F.	4,650	\$742	\$3,450,300	Assume rip-rap lined stormwater conveyance channels and rip-rap lined let-downs off of cap. Assume 3500 LF of stormwater channels / let downs.
	14	SEED / FERTILIZE / MULCH	ACRE	11	\$3,767	\$41,437	Assume total area to be restored will be mulched, fertilized, and seeded.
	<b>CONTINGENCY / ENGINEERING SUPPORT</b>						
CONTINGENCY / ENGINEERING SUPPORT	15	CONTINGENCY (25%)	LS	1	\$2,065,813	\$2,065,813	
	16	ENGINEERING SUPPORT (DESIGN AND CQ 10%)	LS	1	\$1,035,237	\$1,035,237	
	<b>POST-CLOSURE</b>						
POST-CLOSURE	17	GROUNDWATER MONITORING FOR ASH BASIN	ANNUAL	30	\$50,000	\$1,500,000	Annual groundwater monitoring costs for each CCR impoundment
	18	OPERATIONS & MAINTENANCE (O&M) FOR CLOSURE-IN-PLACE CAP AREA	ANNUAL	30	\$27,500	\$825,000	Annual O&M costs are \$2500/acre/yr for the total closed area with cap.
	<b>POST CLOSURE CONTINGENCY / ENGINEERING COST</b>						
POST CLOSURE CONTINGENCY / ENGINEERING COST	19	CONTINGENCY (25%)	LS	1	\$581,250	\$581,250	
	20	ENGINEERING COST (10%)	LS	1	\$290,625	\$290,625	
		<b>TOTAL</b>				<b>\$14,561,177</b>	

 CALCULATION SHEET	PROJECT <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-in-Place	SHEET Close-in-Place Assumptions	REV. NO. A
	SUBJECT <b>Preliminary Project Costs Sheets</b>	IMPOUNDMENT NAME: West Ash Basin			AECOM JOB NO. 60669161
	ACTIVITY <b>Close-in-Place Assumptions</b>	CLOSURE OPTION: Close-in-Place	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/04/21	REVIEWED BY: Rob Boeing


### KEY ASSUMPTIONS

The following key assumptions and limitations are associated with the project design, implementation and performance:

1	The cost estimates were prepared using 2021 dollars and do not include any escalation.
2	A 25% contingency has been included for this cost estimate.
3	Engineering design and CQA cost has been included for this cost estimate based on reasonable assumptions.
4	Interstitial water treatment was assumed to continue until construction is completed.
5	To establish the positive slopes, assume existing ash will be utilized to establish crown.
6	Cap cross section for the CCR impoundment will consist of flexible membrane liner, geocomposite drainage layer, and 24-inches of final cover soil overlain by 12-inches of topsoil.
7	Final cover soil assumed to be available onsite and topsoil would come from offsite
8	Groundwater monitoring costs are for the existing network system. Groundwater monitoring costs do not include costs incurred for any additional well installation. Maintenance costs for wells are included in post-closure O&M costs.
9	O&M costs include, but are not limited to, the monitoring and maintenance/repair of the groundwater monitoring system, cap system, and storm water controls.
10	Statements of Probable Construction Cost prepared by AECOM represent AECOM's judgment as a design professional familiar with the construction industry. It is recognized, however, that neither AECOM nor the Owner has control over the cost of labor, materials or equipment nor over the contractor's methods of determining the bid price or other competitive bidding, market, or negotiating conditions. Accordingly, AECOM cannot and does not warrant or represent that proposals, bids or actual construction costs will not vary from any statement of Probable Construction Cost or other estimates or evaluations prepared by AECOM.

 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-by-removal	SHEET: Cost Summary	REV. NO.: A	
	SUBJECT: <b>Preliminary Project Costs Sheets</b>	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO.: 60669161	
	ACTIVITY: <b>Cost Summary: Close-by-Removal Cost Estimate for CCR Impoundment</b>	CLOSURE OPTION: East - Closure-by-Removal	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/4/2021	REVIEWED BY: Rob Boeing	

<b>Waukegan East Ash Basin: Closure-by-Removal Closure &amp; Post-Closure Cost Summary</b>	
Close-by-Removal Tasks	Cost (2021 Dollars)
Mobilization / Site Prep / Demobilization	\$1,248,093
Achieve Closure-by-Removal / Convey Material	\$7,259,984
Stormwater Management / E&S Controls / Site Restoration	\$294,135
Contingency (25%)	\$2,200,553
Engineering Support (Design & CQA)	\$5,000,000
<b>Total Closure Cost of CCR Impoundment =</b>	<b>\$16,002,765</b>
Post-Closure Tasks	Cost (2021 Dollars)
Groundwater Monitoring	\$150,000
Operations & Maintenance (O&M)	\$0
Contingency (25%)	\$37,500
Engineering Costs (10%)	\$18,750
<b>Total Post-Closure of CCR Impoundment =</b>	<b>\$206,250</b>
<b>Total Closure &amp; Post-Closure of CCR Impoundment Cost =</b>	<b>\$16,209,015</b>

 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-by-removal	SHEET: Close-by-Removal Costs	REV. NO.: A
	SUBJECT: <b>Preliminary Project Costs Sheets</b>	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY <b>Close-by-Removal Costs: Closure-by-Removal Cost Estimate for CCR Impoundment</b>	CLOSURE OPTION: East - Closure-by-Removal	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/04/21	REVIEWED BY: Rob Boeing


BASIS OF THE ESTIMATE			
YEAR COST BASIS	2021	AREA OF OPEN FREE WATER IN IMPOUNDMENT (AC)	3
TOTAL AREA TO BE RESTORED (AC)	11	AVG. DEPTH OF FREE WATER (FT)	1.5
TOTAL CLOSURE-BY-REMOVAL AREA (AC)	11	VOLUME OF FREE WATER IN IMPOUNDMENT (GAL)	2,000,000
VOLUME OF ASH IN CLOSURE-BY-REMOVAL AREA (CY)	70,000	PERIMETER OF CLOSURE-BY-REMOVAL AREA (L.F.)	3,100

CLOSE-BY-REMOVAL ESTIMATED COSTS							
TASK	ITEM	UNIT	QUANTITY	INSTALLED UNIT COST	IMPOUNDMENT CLOSURE COST	NOTES	
MOBILIZATION / SITE PREP / DEMOBILIZATION	<b>MOBILIZATION / SITE PREP / DEMOBILIZATION</b>						
	1	MOBILIZATION / DEMOBILIZATION	LS	1	\$98,093	\$98,093	Mob/Demob & insurance: (1% of Total EPC Bid Price) includes administration (mtgs, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup).
	2	MODIFICATIONS OF OUTLET STRUCTURES / PIPING	LS	1	\$250,000	\$250,000	Assume outlet structures and piping will be modified.
	3	REMOVAL & FILTRATION OF FREE WATER	MONTHS	9	\$100,000	\$900,000	
ACHIEVE CLOSURE-BY- REMOVAL / CONVEY MATERIAL	<b>ACHIEVE CLOSURE-BY-REMOVAL / CONVEY MATERIAL</b>						
	4	REMOVAL & TREATMENT OF PORE WATER WITHIN ASH	MONTHS	12	\$225,832	\$2,709,984	STEP 1: Start dewatering for Construction time. Based on Construction Time.
	5	EXCAVATE ASH FOR CLOSURE-BY-REMOVAL / STOCKPILE ASH	CY	70,000	\$8.00	\$560,000	Step 2: Assume CCR material must be stockpiled within impoundment area to decant prior to loading. Done in conjunction with Step 1. Decant water collected and treated along with pore water from Step 1.
	6	EXCAVATE / LOAD / HAUL CCR MATERIAL (OFF-SITE LF)	CY	70,000	\$57.00	\$3,990,000	Assume disposal of CCRs at an off-site landfill (assume density of 1.2 tons/cy).

<b>AECOM</b> CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-by-removal	SHEET: Close-by-Removal Costs	REV. NO.: A
	SUBJECT: <b>Preliminary Project Costs Sheets</b>	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY <b>Close-by-Removal Costs: Closure-by-Removal Cost Estimate for CCR Impoundment</b>	CLOSURE OPTION: East - Closure-by-Removal	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/04/21	REVIEWED BY: Rob Boeing

BASIS OF THE ESTIMATE			
YEAR COST BASIS	2021	AREA OF OPEN FREE WATER IN IMPOUNDMENT (AC)	3
TOTAL AREA TO BE RESTORED (AC)	11	AVG. DEPTH OF FREE WATER (FT)	1.5
TOTAL CLOSURE-BY-REMOVAL AREA (AC)	11	VOLUME OF FREE WATER IN IMPOUNDMENT (GAL)	2,000,000
VOLUME OF ASH IN CLOSURE-BY-REMOVAL AREA (CY)	70,000	PERIMETER OF CLOSURE-BY-REMOVAL AREA (L.F.)	3,100


CLOSE-BY-REMOVAL ESTIMATED COSTS							
TASK	ITEM	UNIT	QUANTITY	INSTALLED UNIT COST	IMPOUNDMENT CLOSURE COST	NOTES	
STORMWATER MANAGEMENT / E&S CONTROLS / SITE RESTORATION	<b>STORMWATER MANAGEMENT / E&amp;S CONTROLS / SITE RESTORATION</b>						
	7	SITE EROSION AND SEDIMENT CONTROL	ACRE	11	\$2,000	\$22,000	Assume total area to be restored will require site erosion and sediment control.
	8	TOPSOIL	CY	17,746	\$13.00	\$230,698	Assume 12 inches of top soil needed (obtained off-site) to establish vegetative stabilization over total closed-by-removal area and not covered by the Industrial Landfill
	9	SEED / FERTILIZE / MULCH	ACRE	11	\$3,767	\$41,437	Assume total area of disturbance will be mulched, fertilized, and seeded.
CONTINGENCY / ENGINEERING SUPPORT	<b>CONTINGENCY / ENGINEERING SUPPORT</b>						
	10	CONTINGENCY (25%)	LS	1	\$2,200,553	\$2,200,553	
	11	ENGINEERING SUPPORT (DESIGN AND CQA)	LS	1	\$1,105,145	\$1,105,145	
POST-CLOSURE	<b>POST-CLOSURE</b>						
	12	GROUNDWATER MONITORING	ANNUAL	3	\$50,000	\$150,000	Annual groundwater monitoring costs for each CCR impoundment are based on current groundwater monitoring system.
	13	OPERATIONS & MAINTENANCE (O&M)	ANNUAL	0	\$27,500	\$0	Annual O&M costs are \$2,500/acre/yr for the landfill cap area (includes leachate collection system maintenance). Based on Q3 2018 Post Closure Maintenance data.
POST CLOSURE CONTINGENCY / ENGINEERING COST	<b>CONTINGENCY / ENGINEERING COST</b>						
	14	CONTINGENCY (25%)	LS	1	\$37,500	\$37,500	
	15	ENGINEERING COST (10%)	LS	1	\$18,750	\$18,750	
		<b>TOTAL</b>				<b>\$12,314,160</b>	

 CALCULATION SHEET	PROJECT	PLANT NAME:	CLOSURE TYPE:	SHEET	REV. NO.
	CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN	Waukegan	Closure-by-removal	Close-by-Removal Assumptions	A
	SUBJECT	IMPOUNDMENT NAME:			AECOM JOB NO.
Preliminary Project Costs Sheets	East Ash Basin				60669161
ACTIVITY	CLOSURE OPTION:	LAST UPDATED BY:	DATE LAST MODIFIED:	REVIEWED BY:	
Close-by-Removal Assumptions	East - Closure-by-Removal	PAK	11/04/21	Rob Boeing	


### KEY ASSUMPTIONS

The following key assumptions and limitations are associated with the project design, implementation and performance:

1	The cost estimates were prepared using 2021 dollars and do not include any escalation.
2	A 25% contingency has been included for this cost estimate.
3	Engineering design and CQA cost has been included for this cost estimate based on reasonable assumptions.
4	Interstitial water treatment was assumed to continue until construction is completed.
5	Assumed all CCR material excavated must be stockpiled in close proximity to the impoundment to be decanted. After decanting, the material will be excavated, loaded, and hauled off-site for disposal.
6	Groundwater monitoring costs are for a reduced groundwater network system as compared to the existing system. Groundwater monitoring costs do not include costs incurred for any additional well installation. Maintenance costs for wells are included in post-closure O&M costs.
7	O&M costs include, but are not limited to, the maintenance/repair of the groundwater monitoring system and general maintenance of the former CCR impoundment area.
8	Statements of Probable Construction Cost prepared by AECOM represent AECOM's judgment as a design professional familiar with the construction industry. It is recognized, however, that neither AECOM nor the Owner has control over the cost of labor, materials or equipment nor over the contractor's methods of determining the bid price or other competitive bidding, market, or negotiating conditions. Accordingly, AECOM cannot and does not warrant or represent that proposals, bids or actual construction costs will not vary from any statement of Probable Construction Cost or other estimates or evaluations prepared by AECOM.

 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-in-Place	SHEET: Cost Summary	REV. NO.: A
	SUBJECT: <b>Preliminary Project Costs Sheets</b>	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: <b>Cost Summary: Close-in-Place Cost Estimate for CCR Impoundment</b>	CLOSURE OPTION: Option 1 - Close-in-Place	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/4/2021	REVIEWED BY: Rob Boeing


<b>Waukegan East Ash Basin: Close-in-Place Option 1            Closure &amp; Post-Closure Cost Summary</b>	
Close-in-Place Tasks	Cost (2021 Dollars)
Mobilization / Site Prep	\$1,241,067
Dewatering / Earthwork / Subgrade Prep.	\$2,263,200
Closure System Construction	\$1,158,751
Stormwater Management / E&S Controls / Site Restoration	\$3,513,737
Contingency (25%)	\$2,044,189
Engineering Support (Design & CQA)	\$2,900,000
<b>Total Closure Cost of CCR Impoundment =</b>	<b>\$13,120,943</b>
Post-Closure Tasks	Cost (2021 Dollars)
Groundwater Monitoring	\$1,500,000
Operations & Maintenance (O&M)	\$825,000
Contingency (25%)	\$581,250
Engineering Costs (10%)	\$290,625
<b>Total Post-Closure of CCR Impoundment =</b>	<b>\$3,196,875</b>
<b>Total Closure &amp; Post-Closure of CCR Impoundment Cost = \$16,317,818</b>	

 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-in-Place	SHEET: Close-in-Place Costs	REV. NO.: A
	SUBJECT: Preliminary Project Costs Sheets	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: Cost Summary: Close-in-Place Cost Estimate for CCR Impoundment	CLOSURE OPTION: Option 1 - Close-in-Place	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/04/21	REVIEWED BY: Rob Boeing

BASIS OF THE ESTIMATE			
YEAR COST BASIS	2021	AREA OF OPEN FREE WATER IN IMPOUNDMENT (AC)	3
TOTAL AREA TO BE RESTORED (AC)	11	AVG. DEPTH OF FREE WATER (FT)	1.5
TOTAL IMPOUNDMENT AREA (AC)	11	VOLUME OF FREE WATER IN IMPOUNDMENT (GAL)	2,000,000
VOLUME OF ASH IN IMPOUNDMENT (CY)	70,000	PERIMETER OF IMPOUNDMENT (L.F.)	3,100


CLOSE-IN-PLACE ESTIMATED COSTS							
TASK	ITEM	UNIT	QUANTITY	INSTALLED UNIT COST	IMPOUNDMENT CLOSURE COST	NOTES	
MOBILIZATION / SITE PREP	<b>MOBILIZATION / SITE PREP</b>						
	1	MOBILIZATION	LS	1	\$91,067	\$91,067	Mob/Demob & insurance: (1% of Total EPC Bid Price includes administration (mtgs, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup).
	2	MODIFY OUTLET STRUCTURES / PIPING	LS	1	\$250,000	\$250,000	Modify existing outlet structures and piping.
	3	REMOVAL & FILTRATION OF FREE WATER	MONTHS	9	\$100,000	\$900,000	
DEWATERING / EARTHWORK / SUBGRADE PREP	<b>DEWATERING / EARTHWORK / SUBGRADE PREP</b>						
	4	REMOVAL & TREATMENT OF PORE WATER WITHIN ASH	MONTHS	12	\$100,000	\$1,200,000	Based on Construction Time
	5	ASH REGRADING TO ESTABLISH CROWN	CY	108,000	\$9.50	\$1,026,000	Quantity of earthwork (cut-to-fill) using existing ash to achieve positive slope prior to installation of closure system. Quantity calculated using AutoCAD.
	6	PERIMETER DITCH / TEMP. DIVERSION BERM GRADING	L.F.	3,100	\$12.00	\$37,200	Linear feet around the perimeter of impoundment.
	7	CONTACT STORM WATER TREATMENT	GAL				
CLOSURE SYSTEM CONSTRUCTION	<b>CLOSURE SYSTEM CONSTRUCTION</b>						
	8	24" FINAL COVER SOIL	CY	35,493	\$11.00	\$390,427	24 inches of common soil placed over close-in-place area (assume on-site soils available)
	9	12" TOPSOIL	CY	17,747	\$13.00	\$230,707	12 inches of topsoil (obtained off-site) placed over closure-by-removal area.
	10	FLEXIBLE MEMBRANE LINER (FML)	SQ. FT.	527,076	\$0.42	\$221,372	Alternate Cap System Only: Flexible membrane liner placed over close-in-place area. Assume quantity needed is 10% more than close-in-place area.
	11	GEOCOMPOSITE DRAINAGE LAYER	SQ. FT.	527,076	\$0.60	\$316,246	Alternate Cap System Only: Geocomposite drainage layer placed over close-in-place area. Assume quantity needed is 10% more than close-in-place area.



 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-in-Place	SHEET: Close-in-Place Costs	REV. NO.: A
	SUBJECT: Preliminary Project Costs Sheets	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: Cost Summary: Close-in-Place Cost Estimate for CCR Impoundment	CLOSURE OPTION: Option 1 - Close-in-Place	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/04/21	REVIEWED BY: Rob Boeing

BASIS OF THE ESTIMATE			
YEAR COST BASIS	2021	AREA OF OPEN FREE WATER IN IMPOUNDMENT (AC)	3
TOTAL AREA TO BE RESTORED (AC)	11	AVG. DEPTH OF FREE WATER (FT)	1.5
TOTAL IMPOUNDMENT AREA (AC)	11	VOLUME OF FREE WATER IN IMPOUNDMENT (GAL)	2,000,000
VOLUME OF ASH IN IMPOUNDMENT (CY)	70,000	PERIMETER OF IMPOUNDMENT (L.F.)	3,100

CLOSE-IN-PLACE ESTIMATED COSTS							
TASK	ITEM	UNIT	QUANTITY	INSTALLED UNIT COST	IMPOUNDMENT CLOSURE COST	NOTES	
STORMWATER MANAGEMENT / E&S CONTROLS / SITE RESTORATION	<b>STORMWATER MANAGEMENT / E&amp;S CONTROLS / SITE RESTORATION</b>						
	12	SITE EROSION AND SEDIMENT CONTROL	ACRE	11	\$2,000	\$22,000	Assume total area to be restored will require site erosion and sediment control.
	13	STORMWATER MANAGEMENT / CHANNELS / LET-DOWNS	L.F.	4,650	\$742	\$3,450,300	Assume rip-rap lined stormwater conveyance channels and rip-rap lined let-downs off of cap. Assume 1.5* length of perimeter LF of stormwater channels / let downs.
	14	SEED / FERTILIZE / MULCH	ACRE	11	\$3,767	\$41,437	Assume total area to be restored will be mulched, fertilized, and seeded.
CONTINGENCY / ENGINEERING SUPPORT	<b>CONTINGENCY / ENGINEERING SUPPORT</b>						
	15	CONTINGENCY (25%)	LS	1	\$2,044,189	\$2,044,189	
	16	ENGINEERING SUPPORT (DESIGN AND CQA 10%)	LS	1	\$1,021,000	\$1,021,000	
POST-CLOSURE	<b>POST-CLOSURE</b>						
	17	GROUNDWATER MONITORING FOR ASH BASIN	ANNUAL	30	\$50,000	\$1,500,000	Annual groundwater monitoring costs for each CCR impoundment
	18	OPERATIONS & MAINTENANCE (O&M) FOR CLOSURE-IN-PLACE CAP AREA	ANNUAL	30	\$27,500	\$825,000	Annual O&M costs are \$2500/acre/yr for the total closed area with cap. Based on Q3 2018 Post Closure Maintenance data
CONTINGENCY / ENGINEERING COST	<b>CONTINGENCY / ENGINEERING COST</b>						
	19	CONTINGENCY (25%)	LS	1	\$581,250	\$581,250	
	20	ENGINEERING COST (10%)	LS	1	\$290,625	\$290,625	
	<b>TOTAL</b>				<b>\$14,438,818</b>		


 CALCULATION SHEET	PROJECT <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-in-Place	SHEET Close-in-Place Assumptions	REV. NO. A
	SUBJECT <b>Preliminary Project Costs Sheets</b>	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO. 60669161
	ACTIVITY <b>Close-in-Place Assumptions</b>	CLOSURE OPTION: Option 1 - Close-in-Place	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/04/21	REVIEWED BY: Rob Boeing

**KEY ASSUMPTIONS**

The following key assumptions and limitations are associated with the project design, implementation and performance:	
1	The cost estimates were prepared using 2021 dollars and do not include any escalation.
2	A 25% contingency has been included for this cost estimate.
3	Engineering design and CQA cost has been included for this cost estimate based on reasonable assumptions.
4	Interstitial water treatment was assumed to continue until construction is completed.
5	To establish positive slopes, assume existing ash and on-site fill will be utilized to establish crown
6	Cap cross section for the CCR impoundment will consist of flexible membrane liner, geocomposite drainage layer, and 24-inches of final cover soil overlain by 12-inches of topsoil.
7	Final cover soil assumed to be available onsite and topsoil would come from offsite.
8	Groundwater monitoring costs are for the existing network system. Groundwater monitoring costs do not include costs incurred for any additional well installation. Maintenance costs for wells are included in post-closure O&M costs.
9	O&M costs include, but are not limited to, the monitoring and maintenance/repair of the groundwater monitoring system, cap system, and storm water controls.
10	Statements of Probable Construction Cost prepared by AECOM represent AECOM's judgment as a design professional familiar with the construction industry. It is recognized, however, that neither AECOM nor the Owner has control over the cost of labor, materials or equipment nor over the contractor's methods of determining the bid price or other competitive bidding, market, or negotiating conditions. Accordingly, AECOM cannot and does not warrant or represent that proposals, bids or actual construction costs will not vary from any statement of Probable Construction Cost or other estimates or evaluations prepared by AECOM.


 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-in-Place	SHEET: Cost Summary	REV. NO.: A
	SUBJECT: <b>Preliminary Project Costs Sheets</b>	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: <b>Cost Summary: Close-in-Place Cost Estimate for CCR Impoundment</b>	CLOSURE OPTION: Option 2 - Close-in-Place	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/4/2021	REVIEWED BY: Rob Boeing

<b>Waukegan East Ash Basin: Close-in-Place Option 2            Closure &amp; Post-Closure Cost Summary</b>	
Close-in-Place Tasks	Cost (2021 Dollars)
Mobilization / Site Prep	\$1,270,846
Dewatering / Earthwork / Subgrade Prep.	\$4,904,200
Closure System Construction	\$1,158,751
Stormwater Management / E&S Controls / Site Restoration	\$3,513,737
Contingency (25%)	\$2,711,883
Engineering Support (Design & CQA)	\$2,900,000
<b>Total Closure Cost of CCR Impoundment =</b>	<b>\$16,459,417</b>
Post-Closure Tasks	Cost (2021 Dollars)
Groundwater Monitoring	\$1,500,000
Operations & Maintenance (O&M)	\$825,000
Contingency (25%)	\$581,250
Engineering Costs (10%)	\$290,625
<b>Total Post-Closure of CCR Impoundment =</b>	<b>\$3,196,875</b>
<b>Total Closure &amp; Post-Closure of CCR Impoundment Cost = \$19,656,292</b>	

 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-in-Place	SHEET: Close-in-Place Costs	REV. NO.: A
	SUBJECT: Preliminary Project Costs Sheets	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: Cost Summary: Close-in-Place Cost Estimate for CCR Impoundment	CLOSURE OPTION: Option 2 - Close-in-Place	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/04/21	REVIEWED BY: Rob Boeing


BASIS OF THE ESTIMATE				
YEAR COST BASIS	2021		AREA OF OPEN FREE WATER IN IMPOUNDMENT (AC)	3
TOTAL AREA TO BE RESTORED (AC)	11		AVG. DEPTH OF FREE WATER (FT)	1.5
TOTAL IMPOUNDMENT AREA (AC)	11		VOLUME OF FREE WATER IN IMPOUNDMENT (GAL)	2,000,000
VOLUME OF ASH IN IMPOUNDMENT (CY)	70,000		PERIMETER OF IMPOUNDMENT (L.F.)	3,100

CLOSE-IN-PLACE ESTIMATED COSTS							
TASK	ITEM	UNIT	QUANTITY	INSTALLED UNIT COST	IMPOUNDMENT CLOSURE COST	NOTES	
<b>MOBILIZATION / SITE PREP</b>							
MOBILIZATION / SITE PREP	1	MOBILIZATION	LS	1	\$120,846	\$120,846	Mob/Demob & insurance: (1% of Total EPC Bid Price includes administration (mtgs, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup).
	2	MODIFY OUTLET STRUCTURES / PIPING	LS	1	\$250,000	\$250,000	Modify existing outlet structures and piping.
	3	REMOVAL & FILTRATION OF FREE WATER	MONTHS	9	\$100,000	\$900,000	
<b>DEWATERING / EARTHWORK / SUBGRADE PREP</b>							
DEWATERING / EARTHWORK / SUBGRADE PREP	4	REMOVAL & TREATMENT OF PORE WATER WITHIN ASH	MONTHS	12	\$100,000	\$1,200,000	Based on Construction Time
	5	ASH REGRADING TO ESTABLISH CROWN	CY	386,000	\$9.50	\$3,667,000	Quantity of earthwork (cut-to-fill) using existing ash to achieve positive slope prior to installation of closure system. Quantity calculated using AutoCAD.
	6	PERIMETER DITCH / TEMP. DIVERSION BERM GRADING	L.F.	3,100	\$12.00	\$37,200	Linear feet around the perimeter of impoundment.
	7	CONTACT STORM WATER TREATMENT	GAL				
<b>CLOSURE SYSTEM CONSTRUCTION</b>							
CLOSURE SYSTEM CONSTRUCTION	8	24" FINAL COVER SOIL	CY	35,493	\$11.00	\$390,427	24 inches of common soil placed over close-in-place area (assume on-site soils available)
	9	12" TOPSOIL	CY	17,747	\$13.00	\$230,707	12 inches of topsoil (obtained off-site) placed over closure-by-removal area.
	10	FLEXIBLE MEMBRANE LINER (FML)	SQ. FT.	527,076	\$0.42	\$221,372	Alternate Cap System Only: Flexible membrane liner placed over close-in-place area. Assume quantity needed is 10% more than close-in-place area.
	11	GEOCOMPOSITE DRAINAGE LAYER	SQ. FT.	527,076	\$0.60	\$316,246	Alternate Cap System Only: Geocomposite drainage layer placed over close-in-place area. Assume quantity needed is 10% more than close-in-place area.

 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-in-Place	SHEET: Closure-in-Place Costs	REV. NO.: A
	SUBJECT: Preliminary Project Costs Sheets	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: Cost Summary: Close-in-Place Cost Estimate for CCR Impoundment	CLOSURE OPTION: Option 2 - Close-in-Place	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/04/21	REVIEWED BY: Rob Boeing


BASIS OF THE ESTIMATE				
YEAR COST BASIS	2021		AREA OF OPEN FREE WATER IN IMPOUNDMENT (AC)	3
TOTAL AREA TO BE RESTORED (AC)	11		AVG. DEPTH OF FREE WATER (FT)	1.5
TOTAL IMPOUNDMENT AREA (AC)	11		VOLUME OF FREE WATER IN IMPOUNDMENT (GAL)	2,000,000
VOLUME OF ASH IN IMPOUNDMENT (CY)	70,000		PERIMETER OF IMPOUNDMENT (L.F.)	3,100

CLOSE-IN-PLACE ESTIMATED COSTS							
TASK	ITEM	UNIT	QUANTITY	INSTALLED UNIT COST	IMPOUNDMENT CLOSURE COST	NOTES	
<b>STORMWATER MANAGEMENT / E&amp;S CONTROLS / SITE RESTORATION</b>							
STORMWATER MANAGEMENT / E&S CONTROLS / SITE RESTORATION	12	SITE EROSION AND SEDIMENT CONTROL	ACRE	11	\$2,000	\$22,000	Assume total area to be restored will require site erosion and sediment control.
	13	STORMWATER MANAGEMENT / CHANNELS / LET-DOWNS	L.F.	4,650	\$742	\$3,450,300	Assume rip-rap lined stormwater conveyance channels and rip-rap lined let-downs off of cap. Assume 1.5" length of perimeter LF of stormwater channels / let downs.
	14	SEED / FERTILIZE / MULCH	ACRE	11	\$3,767	\$41,437	Assume total area to be restored will be mulched, fertilized, and seeded.
<b>CONTINGENCY / ENGINEERING SUPPORT</b>							
CONTINGENCY / ENGINEERING SUPPORT	15	CONTINGENCY (25%)	LS	1	\$2,711,883	\$2,711,883	
	16	ENGINEERING SUPPORT (DESIGN AND CQA 10%)	LS	1	\$1,357,869	\$1,357,869	
<b>POST-CLOSURE</b>							
POST-CLOSURE	17	GROUNDWATER MONITORING FOR ASH BASIN	ANNUAL	30	\$50,000	\$1,500,000	Annual groundwater monitoring costs for each CCR impoundment
	18	OPERATIONS & MAINTENANCE (O&M) FOR CLOSURE-IN-PLACE CAP AREA	ANNUAL	30	\$27,500	\$825,000	Annual O&M costs are \$2500/acre/yr for the total closed area with cap.
<b>POST CLOSURE CONTINGENCY / ENGINEERING COST</b>							
POST CLOSURE CONTINGENCY / ENGINEERING COST	19	CONTINGENCY (25%)	LS	1	\$581,250	\$581,250	
	20	ENGINEERING COST (10%)	LS	1	\$290,625	\$290,625	
		<b>TOTAL</b>				<b>\$18,114,161</b>	


 CALCULATION SHEET	PROJECT <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-in-Place	SHEET Close-in-Place Assumptions	REV. NO. A
	SUBJECT <b>Preliminary Project Costs Sheets</b>	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO. 60669161
	ACTIVITY <b>Close-in-Place Assumptions</b>	CLOSURE OPTION: Option 2 - Close-in-Place	LAST UPDATED BY: PAK	DATE LAST MODIFIED: 11/04/21	REVIEWED BY: Rob Boeing

**KEY ASSUMPTIONS**

The following key assumptions and limitations are associated with the project design, implementation and performance:	
1	The cost estimates were prepared using 2021 dollars and do not include any escalation.
2	A 25% contingency has been included for this cost estimate.
3	Engineering design and CQA cost has been included for this cost estimate based on reasonable assumptions.
4	Interstitial water treatment was assumed to continue until construction is completed.
5	To establish the positive slopes, assume existing ash and on-site fill will be utilized to establish crown.
6	Cap cross section for the CCR impoundment will consist of flexible membrane liner, geocomposite drainage layer, and 24-inches of final cover soil overlain by 12-inches of topsoil.
7	Final cover soil assumed to be available onsite and topsoil would come from offsite
8	Groundwater monitoring costs are for the existing network system. Groundwater monitoring costs do not include costs incurred for any additional well installation. Maintenance costs for wells are included in post-closure O&M costs.
9	O&M costs include, but are not limited to, the monitoring and maintenance/repair of the groundwater monitoring system, cap system, and storm water controls.
10	Statements of Probable Construction Cost prepared by AECOM represent AECOM's judgment as a design professional familiar with the construction industry. It is recognized, however, that neither AECOM nor the Owner has control over the cost of labor, materials or equipment nor over the contractor's methods of determining the bid price or other competitive bidding, market, or negotiating conditions. Accordingly, AECOM cannot and does not warrant or represent that proposals, bids or actual construction costs will not vary from any statement of Probable Construction Cost or other estimates or evaluations prepared by AECOM.

 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-in-Place	SHEET: Cost Summary	REV. NO.: A
	SUBJECT: Preliminary Project Costs Sheets	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: <b>Cost Summary: Close-in-Place Cost Estimate for CCR Impoundment</b>	CLOSURE OPTION: Option 3 - Close-in-Place	LAST UPDATED BY: MLB	DATE LAST MODIFIED: 11/23/2021	REVIEWED BY: Jeremy Thomas


<b>Waukegan East Ash Basin: Close-in-Place Option 3            Closure &amp; Post-Closure Cost Summary</b>	
Close-in-Place Tasks	Cost (2021 Dollars)
Mobilization / Site Prep	<b>\$1,268,991</b>
Dewatering / Earthwork / Subgrade Prep.	<b>\$4,372,200</b>
Closure System Construction	<b>\$1,617,165</b>
Stormwater Management / E&S Controls / Site Restoration	<b>\$3,461,834</b>
Contingency (25%)	<b>\$2,680,048</b>
Engineering Support (Design & CQA)	<b>\$2,900,000</b>
<b>Total Closure Cost of CCR Impoundment =</b>	<b>\$16,300,238</b>
Post-Closure Tasks	Cost (2021 Dollars)
Groundwater Monitoring	<b>\$1,500,000</b>
Operations & Maintenance (O&M)	<b>\$825,000</b>
Contingency (25%)	<b>\$581,250</b>
Engineering Costs (10%)	<b>\$290,625</b>
<b>Total Post-Closure of CCR Impoundment =</b>	<b>\$3,196,875</b>
<b>Total Closure &amp; Post-Closure of CCR Impoundment Cost = \$19,497,113</b>	

 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-in-Place	SHEET: Close-in-Place Costs	REV. NO.: A
	SUBJECT: Preliminary Project Costs Sheets	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: Cost Summary: Close-in-Place Cost Estimate for CCR Impoundment	CLOSURE OPTION: Option 3 - Close-in-Place	LAST UPDATED BY: MLB	DATE LAST MODIFIED: 11/23/21	REVIEWED BY: Jeremy Thomas

BASIS OF THE ESTIMATE				
YEAR COST BASIS	2021		AREA OF OPEN FREE WATER IN IMPOUNDMENT (AC)	3
TOTAL AREA TO BE RESTORED (AC)	11		AVG. DEPTH OF FREE WATER (FT)	1.5
TOTAL IMPOUNDMENT AREA (AC)	11		VOLUME OF FREE WATER IN IMPOUNDMENT (GAL)	2,000,000
VOLUME OF ASH IN IMPOUNDMENT (CY)	70,000		PERIMETER OF IMPOUNDMENT (L.F.)	3,100

CLOSE-IN-PLACE ESTIMATED COSTS							
TASK	ITEM	UNIT	QUANTITY	INSTALLED UNIT COST	IMPOUNDMENT CLOSURE COST	NOTES	
MOBILIZATION / SITE PREP	<b>MOBILIZATION / SITE PREP</b>						
	1	MOBILIZATION	LS	1	\$118,991	\$118,991	Mob/Demob & insurance: (1% of Total EPC Bid Price includes administration (mtgs, health & safety, trailer, phone/fax/electricity, temporary facilities, utilities, roll off boxes, waste disposal, and cleanup).
	2	MODIFY OUTLET STRUCTURES / PIPING	LS	1	\$250,000	\$250,000	Modify existing outlet structures and piping.
	3	REMOVAL & FILTRATION OF FREE WATER	MONTHS	9	\$100,000	\$900,000	
DEWATERING / EARTHWORK / SUBGRADE PREP	<b>DEWATERING / EARTHWORK / SUBGRADE PREP</b>						
	4	REMOVAL & TREATMENT OF PORE WATER WITHIN ASH	MONTHS	12	\$100,000	\$1,200,000	Based on Construction Time
	5	ASH REGRADING TO ESTABLISH CROWN	CY	330,000	\$9.50	\$3,135,000	Quantity of earthwork (cut-to-fill) using existing ash to achieve positive slope prior to installation of closure system. Quantity calculated using AutoCAD.
	6	PERIMETER DITCH / TEMP. DIVERSION BERM GRADING	L.F.	3,100	\$12.00	\$37,200	Linear feet around the perimeter of impoundment.
	7	CONTACT STORM WATER TREATMENT	GAL				
CLOSURE SYSTEM CONSTRUCTION	<b>CLOSURE SYSTEM CONSTRUCTION</b>						
8	FINAL COVER SYSTEM - ENGINEERED TURF	SF	588,060	\$2.75	\$1,617,165		



 CALCULATION SHEET	PROJECT: <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-in-Place	SHEET: Close-in-Place Costs	REV. NO.: A
	SUBJECT: Preliminary Project Costs Sheets	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO.: 60669161
	ACTIVITY: Cost Summary: Close-in-Place Cost Estimate for CCR Impoundment	CLOSURE OPTION: Option 3 - Close-in-Place	LAST UPDATED BY: MLB	DATE LAST MODIFIED: 11/23/21	REVIEWED BY: Jeremy Thomas

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CLOSE-IN-PLACE ESTIMATED COSTS							
TASK	ITEM	UNIT	QUANTITY	INSTALLED UNIT COST	IMPOUNDMENT CLOSURE COST	NOTES	
STORMWATER MANAGEMENT / E&S CONTROLS / SITE RESTORATION	<b>STORMWATER MANAGEMENT / E&amp;S CONTROLS / SITE RESTORATION</b>						
	9	SITE EROSION AND SEDIMENT CONTROL	ACRE	2	\$2,000	\$4,000	Assume total area to be restored will require site erosion and sediment control.
	10	STORMWATER MANAGEMENT / CHANNELS / LET-DOWNS	L.F.	4,650	\$742	\$3,450,300	Assume rip-rap lined stormwater conveyance channels and rip-rap lined let-downs off of cap. Assume 1.5* length of perimeter LF of stormwater channels / let downs.
	11	SEED / FERTILIZE / MULCH	ACRE	2	\$3,767	\$7,534	Assume total area to be restored will be mulched, fertilized, and seeded.
CONTINGENCY / ENGINEERING SUPPORT	<b>CONTINGENCY / ENGINEERING SUPPORT</b>						
	12	CONTINGENCY (25%)	LS	1	\$2,680,048	\$2,680,048	
	13	ENGINEERING SUPPORT (DESIGN AND CQA 10%)	LS	1	\$1,297,900	\$1,297,900	
POST-CLOSURE	<b>POST-CLOSURE</b>						
	14	GROUNDWATER MONITORING FOR ASH BASIN	ANNUAL	30	\$50,000	\$1,500,000	Annual groundwater monitoring costs for each CCR impoundment
	15	OPERATIONS & MAINTENANCE (O&M) FOR CLOSURE-IN-PLACE CAP AREA	ANNUAL	30	\$27,500	\$825,000	Annual O&M costs are \$2500/acre/yr for the total closed area with cap.
POST CLOSURE CONTINGENCY / ENGINEERING COST	<b>POST CLOSURE CONTINGENCY / ENGINEERING COST</b>						
	16	CONTINGENCY (25%)	LS	1	\$581,250	\$581,250	
	17	ENGINEERING COST (10%)	LS	1	\$290,625	\$290,625	
		<b>TOTAL</b>				<b>\$17,895,013</b>	

 CALCULATION SHEET	PROJECT <b>CCR IMPOUNDMENT CLOSURE ESTIMATES FOR NRG WAUKEGAN</b>	PLANT NAME: Waukegan	CLOSURE TYPE: Closure-in-Place	SHEET Close-in-Place Assumptions	REV. NO. A
	SUBJECT <b>Preliminary Project Costs Sheets</b>	IMPOUNDMENT NAME: East Ash Basin			AECOM JOB NO. 60669161
	ACTIVITY <b>Close-in-Place Assumptions</b>	CLOSURE OPTION: Option 3 - Close-in-Place	LAST UPDATED BY: MLB	DATE LAST MODIFIED: 11/23/21	REVIEWED BY: Jeremy Thomas

**KEY ASSUMPTIONS**

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**ATTACHMENT C**

REPORT

# NUMERICAL GROUNDWATER FLOW MODEL

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Groundwater Flow Modeling in Support of CCR  
Compliance and Permitting  
Midwest Generation, LLC  
Waukegan Generating Station  
Waukegan, Illinois

Submitted to:

**KPRG and Associates, Inc.**

14665 W. Lisbon Road, Suite 1A  
Brookfield, WI 53005

and:

**Midwest Generation, LLC**

Waukegan Generating Station  
401 E. Greenfield Ave.  
Waukegan, IL 60087

Prepared by:

**BAS Groundwater Consulting Inc.**

3649 Evergreen Parkway Ste 1510  
Evergreen, Colorado 80437  
+1 720 334-8249

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January 27, 2022

**ATTACHMENT D**

CLOSURE ALTERNATIVES RANKING MATRIX  
MWG WAUKEGAN STATION  
WAUKEGAN, ILLINOIS

Options

- 1) West Ash Basin -- Closure-by-Removal
- 2) West Ash Basin -- Closure-in-Place
- 3) East Ash Basin -- Closure-by-Removal
- 4) East Ash Basin -- Closure-in-Place (Option 1)
- 5) East Ash Basin -- Closure-in-Place (Option 2)
- 6) East Ash Basin -- Closure-in-Place (Option 3)

Part 845 Reference Section	Regulatory Comparison Criteria	Ranking					
		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
845.710(b)(1)(A)	Magnitude of reduction of existing risks.	5	4	5	4	4	4
845.710(b)(1)(B)	Magnitude of residual risks in terms of likelihood of future releases of CCR.	5	4	5	4	4	4
845.710(b)(1)(C)	Type and degree of long-term management required, including monitoring, operation, and maintenance.	5	4	5	4	4	4
845.710(b)(1)(D)	Short-term risks that might be posed to the community or the environment during implementation of such a closure, including potential threats to human health and the environment associated with excavation, transportation, and re-disposal of contaminants.	3	5	3	5	5	5
845.710(b)(1)(E)	Time until closure and post-closure care or the completion of groundwater monitoring pursuant to Section 845.740(b) is completed.	5	4	5	4	4	4
845.710(b)(1)(F)	Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, re-disposal, containment or changes in groundwater flow.	4	5	4	5	5	5
845.710(b)(1)(G)	Long-term reliability of the engineering and institutional controls, including an analysis of any off-site, nearby destabilizing activities.	5	5	5	5	5	5
845.710(b)(1)(H)	Potential need for future corrective action of the closure alternative.	5	4	5	4	4	4
845.710(b)(2)(A)	Extent to which containment practices will reduce further releases.	5	5	5	5	5	5
845.710(b)(2)(B)	Extent to which treatment technologies may be used.	5	5	5	5	5	5
845.710(b)(3)(A)	Degree of difficulty associated with constructing the technology.	5	5	5	5	5	5
845.710(b)(3)(B)	Expected operational reliability of the technologies.	5	5	5	5	5	5
845.710(b)(3)(C)	Need to coordinate with and obtain necessary approvals and permits from other agencies.	5	5	5	5	5	5
845.710(b)(3)(D)	Availability of necessary equipment and specialists.	5	5	5	5	5	5
845.710(b)(3)(E)	Available capacity and location of needed treatment, storage, and disposal services.	4	5	4	5	5	5
845.710(b)(4)	The degree to which the concerns of the residents living within communities where the CCR will be handled, transported and disposed are addressed by the closure method.						
845.710(d)(1)	Analyze complete removal of the CCR as one closure alternative, along with the modes for transporting the removed CCR, including by rail, barge, low-polluting trucks, or a combination of these transportation modes.	5	5	5	5	5	5
845.710(d)(2)	Identify whether the facility has an onsite landfill with remaining capacity that can legally accept CCR, and, if not, whether constructing an onsite landfill is possible.	4	5	4	5	5	5
845.710(d)(3)	Include any other closure method in the alternatives analysis if requested by the Agency.	-	-	-	-	-	-
845.710(d)(1)	Meet or exceed a class 4 estimate under the AACE Classification Standard, incorporated by reference in Section 845.150, or a comparable classification practice as provided in the AACE Classification Standard.	5	5	5	5	5	5
845.710(d)(2)	Contain the results of groundwater contaminant transport modeling and calculations showing how the closure alternative will achieve compliance with the applicable groundwater protection standards.	5	5	5	5	5	5
845.710(d)(3)	Include a description of the fate and transport of contaminants with the closure alternative over time, including consideration of seasonal variations.	5	5	5	5	5	5
845.710(d)(4)	Assess impacts to waters in State.	5	5	5	5	5	5
	Total	100	100	100	100	100	100