



J.H. Campbell Generating Facility

Dry Ash Landfill and Cell 5 Lateral Expansion - Closure Plan

Pursuant to:
40 CFR 257.102

Submitted to:
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Submitted by:
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December 2018

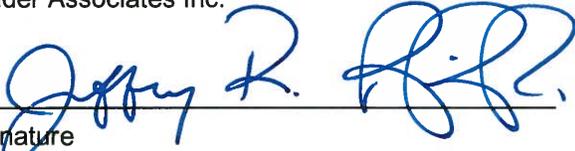


CERTIFICATION

Professional Engineer Certification Statement [40 CFR 257.102(b)(4)]

I hereby certify that, having reviewed the attached documentation and being familiar with the provisions of Title 40 of the Code of Federal Regulations Section 257.102 (40 CFR Part 257.102), I attest that this Closure Plan is accurate and has been prepared in accordance with good engineering practices, including the consideration of applicable industry standards, and with the requirements of 40 CFR Part 257.102.

Golder Associates Inc.


Signature

December 5, 2018

Date of Report Certification

Jeffrey R. Piaskowski, PE

Name

6201061033

Professional Engineer Certification Number



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1.0 INTRODUCTION

On April 17, 2015, the United States Environmental Protection Agency (EPA) issued the Coal Combustion Residual (CCR) Resource Conservation and Recovery Act (RCRA) Rule (40 CFR 257 Subpart D) (“CCR RCRA Rule”) to regulate the beneficial use and disposal of CCR materials generated at coal-fired electrical power generating complexes. In accordance with the CCR RCRA Rule, any CCR surface impoundment or CCR landfill that was actively receiving CCR on the effective date of the CCR RCRA Rule (October 19, 2015) was deemed to be an “Existing CCR Unit” on that date and subject to self-implementing compliance standards and schedules. Consumers Energy Company (CEC) currently operates the Dry Ash Landfill CCR unit (Dry Ash Landfill) at the J.H. Campbell Generating Facility (JH Campbell). JH Campbell is located in West Olive, Michigan as presented on Sheet 1 of Appendix A – Landfill Closure Grading Plan.

The JH Campbell Dry Ash Landfill was permitted as a Type III landfill by the Michigan Department of Natural Resources (MDNR) in 1993 (MDNR 1993) and licensed under State of Michigan Part 115, Solid Waste Management of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (Part 115). In March 2018, CEC submitted a permit upgrade request (Golder 2018) to the Michigan Department of Environmental Quality Office of Waste Management and Radiological Protection (MDEQ) for the JH Campbell Dry Ash Landfill. The permit update request was submitted to comply with Part 115 and the RCRA CCR Rule for lateral expansions of CCR units. The permit upgrade request was approved by MDEQ in June 2018 (MDEQ 2018). Subsequent to MDEQ approval, the JH Campbell Dry Ash Landfill Cell 5 Expansion was constructed. Before CCR can be placed in the JH Campbell Dry Ash Landfill Cell 5 Expansion, an initial written closure plan must be prepared in accordance with 40 CFR 257.102(b)(2)(ii).

This written closure plan serves as the initial closure plan for the JH Campbell Dry Ash Landfill Cell 5 Expansion and amended closure plan for the JH Campbell Dry Ash Landfill. The closure plan was generated pursuant to 40 CFR 257.102(a) and describes the steps necessary to close the JH Campbell Dry Ash Landfill consistent with recognized and generally accepted good engineering practices. This closure plan is being prepared with the assumption that the Dry Ash Landfill will not receive waste beyond May 1, 2040, when it is anticipated that JH Campbell will be closed and decommissioned.

2.0 SUMMARY OF PREVIOUS CLOSURE PHASES

Construction of the Dry Ash Landfill began in 1997 and, to date, five cells (Cells 1 through 5) have been constructed. CCR is currently being placed in Cells 3 and 4. CCR will be placed in Cell 5 subsequent to placing the required RCRA certifications in the operating record and subsequent to MDEQ review and acceptance of the Cell 5 Liner Construction Quality Assurance report and Operating License approval request. Portions of Cells 1, 2, and 3 have been closed between 2006 and 2014, as summarized in Table 2.0.1 – Summary of Previous Closure Phases.

Table 2.0.1 - Summary of Previous Closure Phases

| Phase | Year Completed | Areas Closed |
|-------------------|----------------|---|
| Closure Phase I | 2006 | Northern area of Cells 1 and 2 |
| Closure Phase II | 2007 | Southeast area of Cell 2 and northeast area of Cell 3 |
| Closure Phase III | 2009 | East and southeast area of Cell 3 |
| Closure Phase IV | 2012 | Southeast area of Cell 2 and central northeast area of Cell 3 |
| Closure Phase V | 2014 | Southern area of Cell 2 |

3.0 NARRATIVE DESCRIPTION [40 CFR 257.102(b)(1)(i,iii-v)]

The Dry Ash Landfill will be closed with CCR in place and capped with a final cover system. Design grades will be reached with construction of a 2.5-foot-thick final cover system designed with a minimum two percent slope to meet performance standard requirements per 40 CFR 257.102(d)(3)(ii). Details of the closure construction are provided in the following sections.

3.1 Dry Ash Landfill CCR Quantity [40 CFR 257.102(b)(1)(iv)]

The Dry Ash Landfill has 9,500,000 cubic yards (cy) of permitted landfill air space which, if fully utilized, may equal the maximum inventory of CCR onsite over the life of the CCR unit.

3.2 Dry Ash Landfill Final Cover Area [40 CFR 257.102(b)(1)(v)]

For closure planning purposes as described in Section 4.2, the largest area of the Dry Ash Landfill requiring a final cover is 40 acres.

3.3 Closure Construction Sequence [40 CFR 257.102(b)(1)(i,iii)] and [40 CFR 257.102(d)(1)]

The remaining active areas of the Dry Ash Landfill will continue to be closed in phases. Once an area has reached planned final grade, it will be closed with CCR in place and capped with a final cover system. Design and construction of the final cover system are discussed in the following sections.

3.3.1 Final Cover System Design and Performance [40 CFR 257.102(b)(1)(iii)] and [40 CFR 257.102(d)(3)]

The final cover system will be 2.5-feet-thick and consist of a 40 mil linear low-density polyethylene (LLDPE) textured geomembrane (infiltration layer). The infiltration layer will be overlain with a two-foot-thick layer of sand (protective cover). The protective cover will be overlain with a six-inch-thick erosion layer. The erosion layer consists of topsoil, seed, fertilizer, and mulch in accordance with Michigan Department of Transportation (MDOT) Standard Specification 816 – Turf Establishment. Typical details of the final cover system are provided on Sheet 5 in Appendix A.

Together, the final cover system is designed to:

- Provide a final cover permeability less than 1.0×10^{-5} centimeter per second (cm/sec)
- Control contaminated run-off
- Minimize the need for maintenance
- Control, minimize, or eliminate post-closure infiltration of liquids
- Minimize releases of CCR and leachate into ground and surface waters or the atmosphere
- Prevent the sloughing or movement of the liner

The system is designed with the minimum two percent slope on the top deck and 4H:1V side slopes with diversion berms to:

- Prevent/limit the future impoundment of water, sediment, and slurry
- Minimize erosion
- Prevent/control the release of waste
- Limit the effects of settlement/subsidence

3.3.2 Final Cover Construction [40 CFR 257.102(b)(1)(i)]

The Dry Ash Landfill will be filled to permitted grade with CCR as presented on Sheet 2 – Top of Ash in Appendix A. Once CCR has been placed to design grades, the final cover system described in Section 3.3.1 will be constructed and tested to document it meets the requirements of the designed final cover.

4.0 SCHEDULE [40 CFR 257.102(b)(1)(vi)]

4.1 Introduction

This closure plan was prepared assuming the Dry Ash Landfill will continue to receive CCR through 2040, when it is anticipated that the generating facility will be closed and decommissioned. In order to close the Dry Ash Landfill during a typical summer construction season and within the six-month timeframe required by 40 CFR 257.102(f)(1)(i), it is assumed for the purpose of this closure plan, that the Dry Ash Landfill will receive its final receipt of waste on April 1, 2040 and initiate closure of remaining unclosed areas by May 1, 2040.

Additionally, it is assumed that active areas of the Dry Ash Landfill will continue to be closed sequentially as they reach permitted grades and that a maximum area of 40 acres will remain to be covered at final closure. In accordance with 40 CFR 257.102(f)(1)(i) and Part 115 R 299.4317, the closure activities are expected to be completed within six months of the notification for intent to initiate closure.

4.2 Closure Construction Schedule

The closure construction schedule is developed assuming that the last active portion of the Dry Ash Landfill will not be in excess of 40 acres. Table 4.2.1 – Closure Schedule Production Estimate indicates that 40 acres could be effectively closed within six months, as required by 40 CFR 257.102(f)(1)(i).

Table 4.2.1 - Closure Schedule Production Estimate

| Closure Component | Quantity | Units | Construction Rate | Rate Units | Required Time in Days |
|---|-----------|-------------|-------------------|---------------------|-----------------------|
| 40-mil LLDPE geomembrane (infiltration layer) | 1,750,000 | square feet | 45,000 | square feet per day | 39 |
| 24-inch-thick sand layer (protective cover) | 130,000 | cubic yards | 5,000 | cubic yards per day | 26 |
| 6-inch-thick topsoil (erosion layer) | 32,500 | cubic yards | 5,000 | cubic yards per day | 7 |
| Seed, fertilizer, mulch (erosion layer) | 1,750,000 | square feet | 300,000 | square feet per day | 5 |
| Workdays Required = | | | | | 77 |

It is anticipated that closure construction will begin on or before May 1, 2040 in order to comply with the closure schedule. Conservatively assuming a start to finish construction schedule, the final cover construction will take approximately 16 weeks. Using these assumptions results in completion of the final cover construction on August 19, 2040. Table 4.2.2 – Conceptual Final Cover Construction Schedule Milestones contains a list of milestone dates that were developed as part of the closure construction schedule to demonstrate that closure will be completed within the self-implementing closure schedule per 40 CFR 257.102(f)(1)(i).

Table 4.2.2 - Conceptual Final Cover Construction Schedule Milestones

| Closure Component | Start Date | End Date |
|---|-----------------|-------------------|
| Monitor groundwater | January 1, 2016 | June 1, 2040 |
| Notification of closure | NA | May 1, 2040 |
| 40-mil LLDPE geomembrane (infiltration layer) | May 2, 2040 | June 27, 2040 |
| 24-inch-thick sand layer (protective cover) | June 28, 2040 | August 2, 2040 |
| 6-inch-thick topsoil (erosion layer) | August 3, 2040 | August 13, 2040 |
| Seed, fertilizer, mulch (erosion layer) | August 14, 2040 | August 20, 2040 |
| Closure activities complete | NA | August 20, 2040 |
| Certified closure report | NA | December 31, 2040 |

4.3 Closure Deadline Extension [40 CFR 257.102(f)(2)]

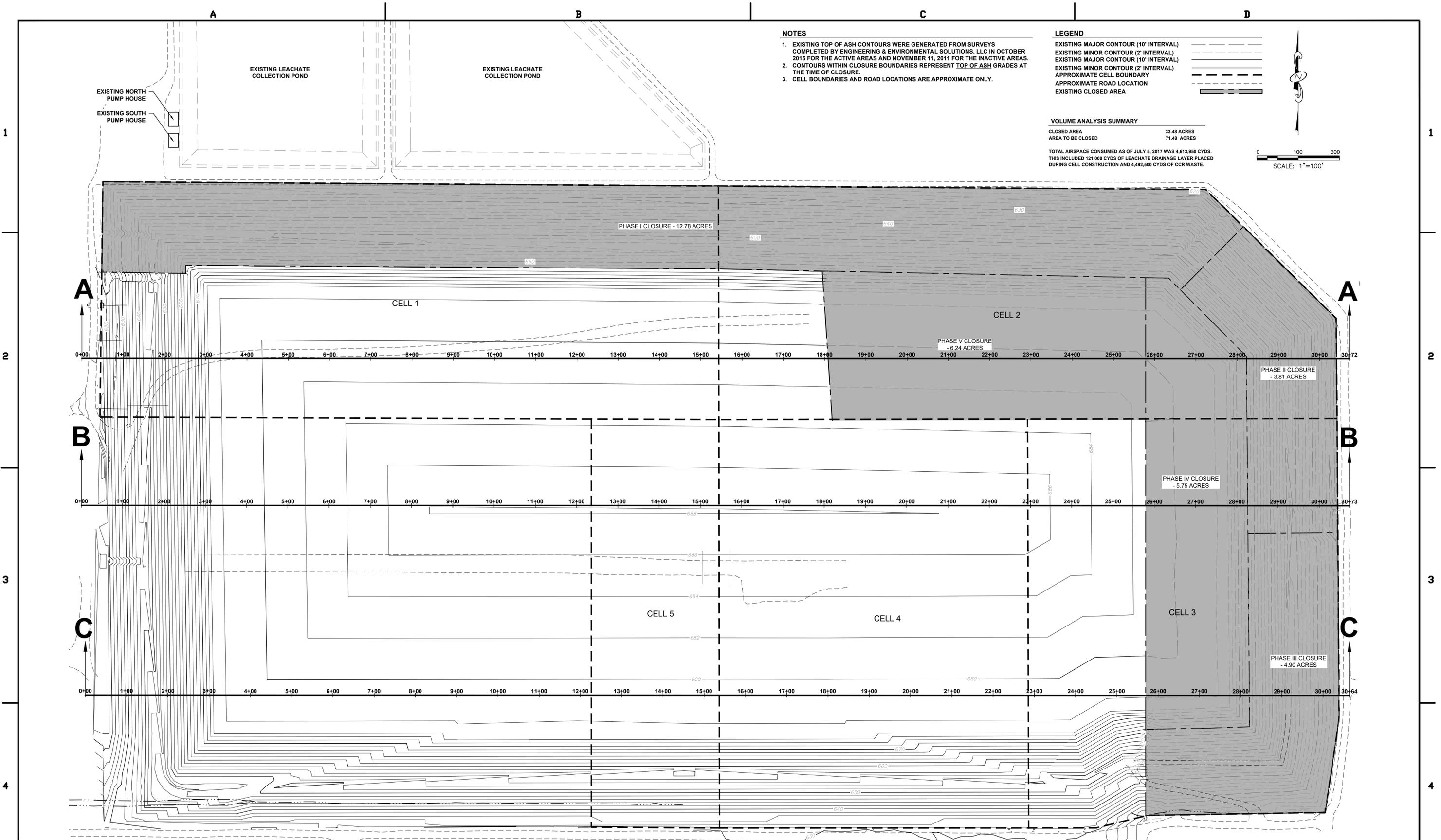
As previously indicated in Section 4.1, closure of existing CCR landfills must be completed within six months of initiating closure in accordance with 40 CFR 257.102(f)(1)(i). However, a deadline extension can be obtained as outlined in 40 CFR 257.102(f)(2) if completion of closure is not feasible within six months (e.g., shortened construction season, significant weather delays, time required for dewatering CCR, delays due to state or local permitting or approval, etc.). An extension must include a narrative description that demonstrates closure is not feasible in the required timeframe in accordance with 40 CFR 257.102(f)(2)(i,iii). The closure deadline for the Dry Ash Landfill may be extended up to two years in one-year increments per 40 CFR 257.102(f)(2)(ii)(A).

5.0 REFERENCES

- Golder Associates Inc. March 2018. J.H. Campbell Dry Ash Landfill, Construction Permit Upgrade Request, Cells 5 through 9.
- Michigan Department of Environmental Quality. June 2018. Construction Permit number 0299 - upgrade approval letter.
- Michigan Department of Natural Resources. December 1993. Construction Permit Number 0299.
- State of Michigan. 1994. Part 115, Solid Waste Management of the Natural Resources and Environmental Protection Act, PA 451, as amended.
- United States Environmental Protection Agency (EPA). July 2018. Code of Federal Record Title 40 Part 257 Subpart D, as amended.

APPENDIX A

Landfill Closure Grading Plan



NOTES

- EXISTING TOP OF ASH CONTOURS WERE GENERATED FROM SURVEYS COMPLETED BY ENGINEERING & ENVIRONMENTAL SOLUTIONS, LLC IN OCTOBER 2015 FOR THE ACTIVE AREAS AND NOVEMBER 11, 2011 FOR THE INACTIVE AREAS.
- CONTOURS WITHIN CLOSURE BOUNDARIES REPRESENT TOP OF ASH GRADES AT THE TIME OF CLOSURE.
- CELL BOUNDARIES AND ROAD LOCATIONS ARE APPROXIMATE ONLY.

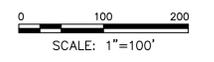
LEGEND

- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- EXISTING MAJOR CONTOUR (10' INTERVAL)
- EXISTING MINOR CONTOUR (2' INTERVAL)
- APPROXIMATE CELL BOUNDARY
- APPROXIMATE ROAD LOCATION
- EXISTING CLOSED AREA

VOLUME ANALYSIS SUMMARY

| | |
|-------------------|-------------|
| CLOSED AREA | 33.48 ACRES |
| AREA TO BE CLOSED | 71.49 ACRES |

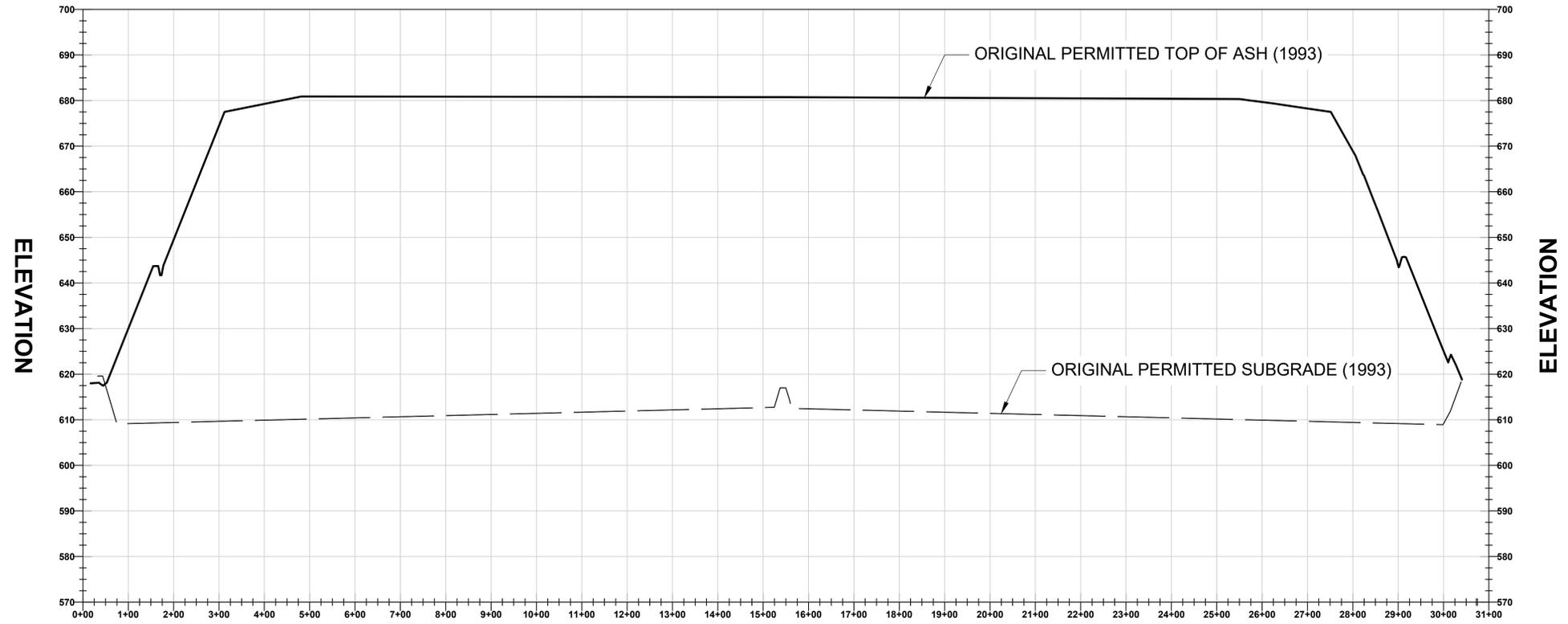
TOTAL AIRSPACE CONSUMED AS OF JULY 5, 2017 WAS 4,613,950 CYDS. THIS INCLUDED 121,000 CYDS OF LEACHATE DRAINAGE LAYER PLACED DURING CELL CONSTRUCTION AND 4,492,950 CYDS OF CCR WASTE.



| | | | | | | | | | | | | | | | | |
|--------------------|-----|------|-------------|----|----|-----|-----|----|-----|-------------------|-----------------------------------|--|----|---|-----|----|
| | | | | | | | | | | SIGNATURE | | J.H. CAMPBELL PLANT WEST OLIVE, MI | | TOP OF ASH SCALE: 1" = 100' DRAWING NO. _____ SHEET 2 REV. _____ | | |
| | | | | | | | | | | NAME | | | | | | |
| | | | | | | | | | | MICHIGAN P.E. No. | | | | | | |
| REFERENCE DRAWINGS | REV | DATE | DESCRIPTION | DR | BY | CHK | APP | CO | REV | DATE | DESCRIPTION | DR | BY | CK | APP | CO |
| | | | | | | | | | | 12-05-18 | 2018 UPDATE | | | | | |
| | | | | | | | | | | 10-06-16 | FILED IN OWNER'S OPERATING RECORD | | | | | |
| | | | | | | | | | | 09-25-16 | ISSUED FOR INTERNAL REVIEW | | | | | |

A B C D

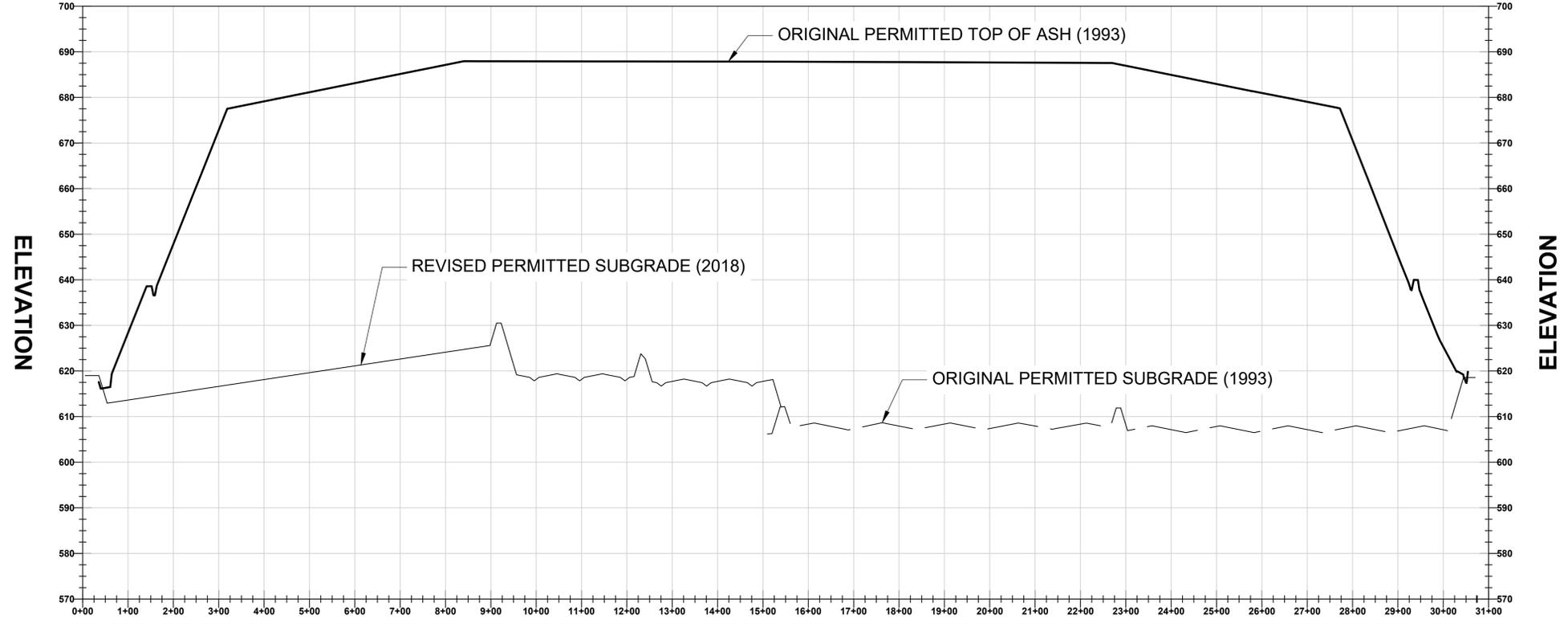
CROSS SECTION A-A



LEGEND

| | |
|-----------------------------|-----------|
| PERMITTED TOP OF ASH (1993) | ————— |
| PERMITTED SUBGRADE (1993) | - - - - - |
| PERMITTED SUBGRADE (2018) | |

CROSS SECTION B-B



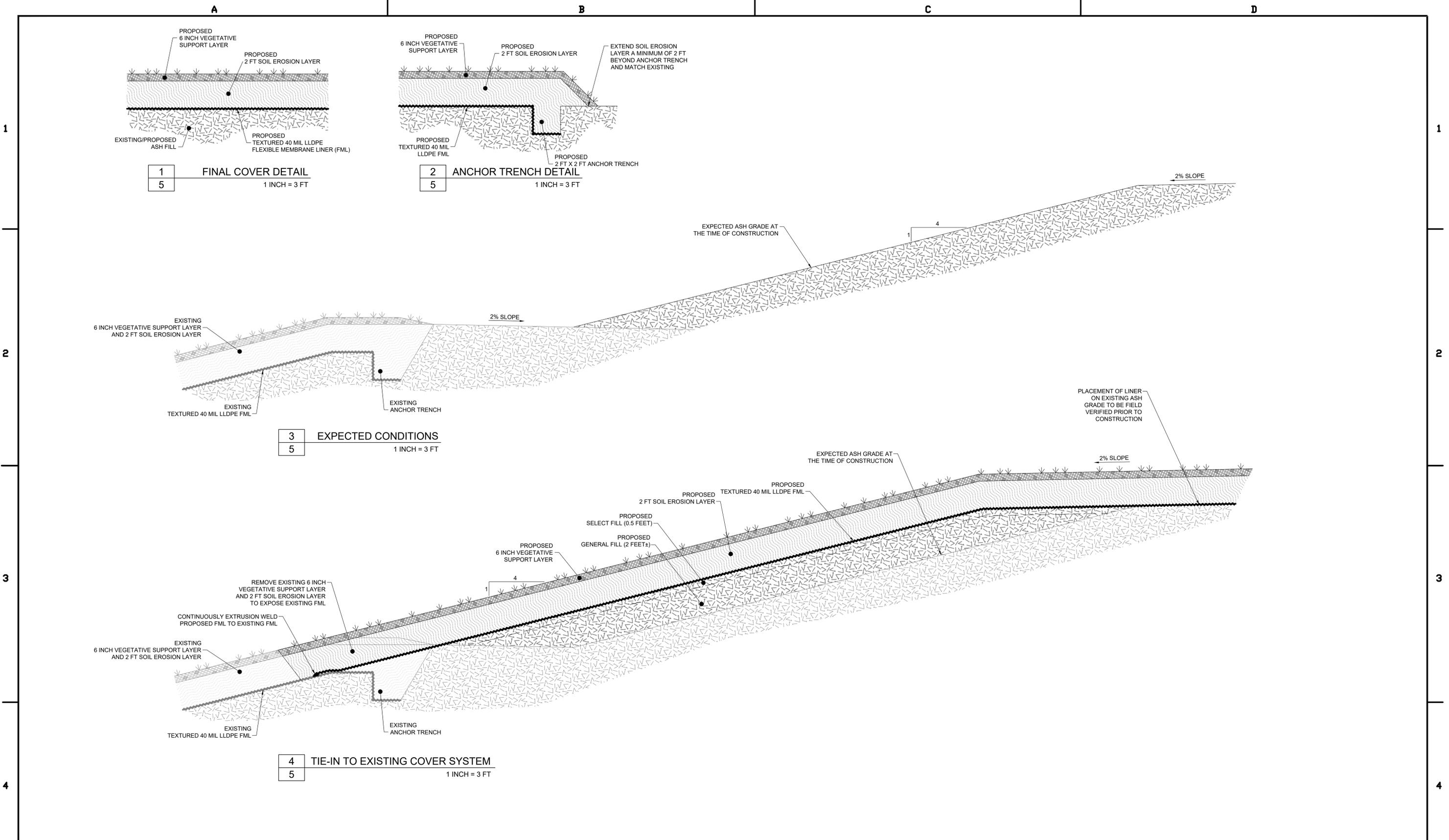
| | | | | | | | | | | SIGNATURE | | J.H. CAMPBELL PLANT WEST OLIVE, MI | | CROSS SECTIONS A-A' & B-B' | | | | | | | | | | |
|--------------------|-----|------|-------------|--|--|--|--|----|----|-------------------|-----|--|-----|---------------------------------------|-------------|-------------|--|-------|--|------|----|----|-----|----|
| | | | | | | | | | | NAME | | | | SCALE: 1" = 150' | | DRAWING NO. | | SHEET | | REV. | | | | |
| | | | | | | | | | | MICHIGAN P.E. No. | | | | JOB | | 3 | | 3 | | | | | | |
| REFERENCE DRAWINGS | REV | DATE | DESCRIPTION | | | | | DR | BY | CHK | APP | CO | REV | DATE | DESCRIPTION | | | | | DR | BY | CK | APP | CO |

A

B

C

D



1 FINAL COVER DETAIL
5 1 INCH = 3 FT

2 ANCHOR TRENCH DETAIL
5 1 INCH = 3 FT

3 EXPECTED CONDITIONS
5 1 INCH = 3 FT

4 TIE-IN TO EXISTING COVER SYSTEM
5 1 INCH = 3 FT

| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------|--|--|--|--|--|--|--|--|--|---------------------------------------|------|-----------------|----|-------------|-----|-------|------|-----|------|-------------|----|----|----|-----|----|---|--|
| | | | | | | | | | | SIGNATURE | | | | DETAILS | | | | | | | | | | | | | |
| | | | | | | | | | | NAME | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | MICHIGAN P.E. No. | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | J.H. CAMPBELL PLANT WEST OLIVE, MI | | SCALE: AS NOTED | | DRAWING NO. | | SHEET | REV. | | | | | | | | | | |
| REFERENCE DRAWINGS | | | | | | | | | | REV | DATE | DESCRIPTION | DR | BY | CHK | APP | CO | REV | DATE | DESCRIPTION | DR | BY | CK | APP | CO | 5 | |

A

B

C

D



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