

**BRIDGETON LANDFILL TEMPORARY CAP AND CAP INTEGRITY SYSTEM  
DESIGN**

**RESPONSE TO MISSOURI DEPARTMENT OF NATURAL RESOURCES - SWMP  
STORMWATER DESIGN APRIL 23, 2013 COMMENTS**

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The MDNR-SWMP comment dated April 23, 2014 for each item is presented in regular font followed immediately by the Bridgeton Landfill, LLC (Bridgeton) **response in bold font.**

COMMENTS

Please note that Bridgeton must meet all necessary requirements and receive approval from the Department's Water Protection Program (WPP) for any land disturbance permits, new outfalls etc.

**BRIDGETON RESPONSE:**

**Bridgeton will obtain the necessary approvals from both the Department's Water Protection Program (WPP) and the City of Bridgeton for site disturbance and excavation permits, new outfalls and other applicable features involving the temporary cap and cap integrity system including stormwater design features. An initial meeting was conducted with the Bridgeton representatives and the WPP on April 9, 2013 to discuss the site (land) disturbance permit and NPDES modification requirements. The Bridgeton landfill is expecting to receive approvals from the City of Bridgeton next week for the pending site disturbance and excavation permits. The NPDES modification permit application will be submitted to WPP immediately following MDNR Solid Waste Management Programs concurrence of the pending design plans.**

1. The Stormwater Management Design report shall be signed and sealed by a registered professional engineer in Missouri.

**BRIDGETON RESPONSE:**

**The revised Stormwater Management Design report included with these response to comments has been signed and sealed by a registered engineer in Missouri.**

2. Page 1-2 Introduction, states that the proposed temporary cap the total exposed temporary cover lined area will compromise 42 acres. Please clarify if extent is just new cap or combined existing with proposed.

**BRIDGETON RESPONSE:**

**The 42 acres pertains to the new cap area combined with the existing cap.**

3. Page 2-2, Table 1, the Total Drainage Area (acres) does not add up correctly, please verify the Total value.

**BRIDGETON RESPONSE:**

**The total drainage area for the west/southwest was revised from 76.5 to 63.6 so the total drainage area of 101.2 acres was correct. In addition, 1.5 acres was shifted for the bowl area from the north drainage area to the east drainage area and this change was incorporated in the revised calculations and Figure 1.**

4. Page 2-2, Section 2.1.1, states that the inlet culverts are CV-1 and CV-3 and the outlet culvert is CV-2. However, the plan sheets show the inlets as CV-1 and CV-2 and the outlet as CV-3. Please verify the naming of these culverts.

**BRIDGETON RESPONSE:**

**Section 2.1.1 has been revised to state that the inlet culverts are CV-1 and CV-2 and that the outlet culvert is CV-3. No change was required for the plan sheets.**

5. Page 2-2, Section 2.1.1, please provide any calculations or information on if the existing detention basin at Outfall 004 in the north section can handle additional flow and capacity, if applicable.

**BRIDGETON RESPONSE:**

**The existing detention basin is approximately 8 acres in size. The discharge from the proposed north detention basin is not expected to impact the existing basin due to the size of the basin. The total runoff for the north drainage area is 2.9 acre-feet, therefore the impact to the existing detention basin would be a rise of only 0.36 feet.**

6. Page 2-2, Section 2.1.1, states “the channel is designed with a 0.20 % slope”. This is an extremely shallow slope. Please address remedial actions to be taken if settlement occurs and water ponds in channel.

**BRIDGETON RESPONSE:**

**The channel was designed with a shallow slope due to the restrictive existing conditions (minimal slope and limited area to construct a channel between the existing temporary cap and existing service road). The proposed channel is located outside of the solid waste area and outside of the quarry limit, and will be constructed on virgin ground, therefore no significant settlement is expected. The channel will be lined with FML as a contingency measure and it is preferable not to disturb the liner. Section 2.1.1 has been revised to include a statement that if settlement of the channel results in minor temporary ponding after a rain event, evaporation will remove the ponded water. If settlement and ponding becomes significant, such as greater than 6 inches, the channel will be regraded and relined.**

7. Page 2-2, Section 2.1.1 states “Both the proposed perimeter channel and north detention basin will be lined with a geomembrane.”. Please identify the type of geomembrane used, such as if the geomembrane will be HDPE or EVOH, or if it will be smooth or textured?

**BRIDGETON RESPONSE:**

**Either HDPE or EVOH geomembrane would function adequately as a liner for the channel and detention basin, therefore to provide flexibility for installation, Section 2.1.1 has been revised to state that the proposed perimeter channel and north detention basin will be lined with a geomembrane, either HDPE or EVOH.**

8. Page 2-5, Section 2.1.4, with the culverts to the existing Outfall 003 being decommissioned, please state if future outfall testing locations will be moved to the old leachate pond and additional changes made, if applicable.

**BRIDGETON RESPONSE:**

**Section 2.1.4 has been revised to state that with the existing Outfall 003 being decommissioned, the future outfall testing location will be moved to the outlet culvert, CV-9 of the proposed southwest detention basin.**

9. Page 2-5, Section 2.1.4, does not provide information or in depth detail about how stormwater management of Perimeter Channels (PCs), culverts, or drainage areas from the amphitheater or old landfill areas. Please provide this detail. In addition, show where the amphitheater leachate tank stormwater structures will connect to the proposed system in applicable plan sheets.

**BRIDGETON RESPONSE:**

**Directions of sheet flow and channel flow have been added to revised Sheet 2 for the amphitheater area and Section 2.1.4 has been revised to include this information. The stormwater calculations included the runoff from the amphitheater and old landfill areas. Stormwater structures connects for the proposed leachate tank to the proposed stormwater management system have been incorporated in revised Sheet 2 of the Engineering Plans.**

10. Page 2-5, Section 2.1.4, please provide additional detail regarding the outlet culvert (CV-9), such as size and outlet erosion blanket/rip rap, if applicable.

**BRIDGETON RESPONSE:**

**Section 2.1.4 has been revised to include a statement that the new southwest detention basin will be constructed with a 24-inch discharge culvert, CV-9, with inlet and outlet riprap protection which outlets to a 20-foot wide by 1.5-foot deep parabolic grass lined channel which drains to an existing ditch in the wooded area west of the proposed southwest basin. The locations of the outlet structures are shown on revised Sheet 5 and details are shown on revised Sheet 7 of the Engineering Plans.**

11. Page 3-1 Conclusions, states “Contingency plans for on-site management of surface water which comes in contact with solid waste shall be specified.” Please state in detail what these plans are.

**BRIDGETON RESPONSE:**

**Section 3(V) includes the following details of the contingency plans for on-site management of stormwater which comes in contact with solid waste. Bridgeton Landfill maintains an assortment of equipment on site to address operations and maintenance of the facility. In the event that leachate or gas condensate is detected above the temporary cap, it will be isolated immediately using soil stockpiled onsite and pumped to a storage container for removal as leachate and the temporary cap will be repaired. If leachate or gas condensate is observed in the lined channel or a detention basin, the liquid will be pumped and removed as quickly as possible using high volume pumping equipment and load-out trucks maintained on site to provide this contingency.**

12. Please provide a table in the narrative showing the dimensions, volumes, and detention times for the three proposed detention basins (north, east and southwest).

**BRIDGETON RESPONSE:**

**The dimensions, volumes and detention times have been added to each of the detention basin tables, Tables 2, 3 and 5 of the revised Report.**

13. Please note the date of the survey used to calculate the stormwater slopes and results.

**BRIDGETON RESPONSE:**

**The last paragraph of the Section 2 narrative has been revised to state that the stormwater slopes and results are based on the topographic map dated February 13, 2013 prepared by Cooper Aerial Surveyors Company and field survey of existing culverts obtained during various dates in March 2013 by Weaver Boos. A reference for the topographic map has also been added to revised Sheets 1 through 6.**

14. Appendix B Routing Diagram, please verify that the outlet culvert is CV-3 and not CV-2 as listed.

**BRIDGETON RESPONSE:**

**The Appendix B Routing Diagram is correct, the outlet culvert is correctly shown as CV-3.**

15. Appendix B Page 5, North Channels states sideslopes as 2:1 and is earth lined. Please clarify these components. (The narrative and plan sheets had previously stated 3:1 slopes and lined w/ FML). In addition, the current peak storage is 0.06' below the channel design, if HydroCAD data is modified, please verify that the 2' deep channel design can withhold the design flow.

**BRIDGETON RESPONSE:**

**The 2:1 sideslopes included in the calculation were correct. The calculation was revised to change the earth lining to FML lining which increased the channel capacity due to the lower manning roughness coefficient for the FML material. The calculated channel flow depth is 1.37 feet which is less than the 2.0 foot channel depth.**

16. Appendix D Page 6 and Appendix E Page 17, Reach 1R: South Toe Perimeter Channel uses a different channel design as shown in Detail 3/8. Please verify which design will be used and make any necessary corrections.

**BRIDGETON RESPONSE:**

**The south perimeter channel is designed with 4:1 slopes on the landfill side, 1:1 slopes on the road side and a minimum 2.0 foot depth. The Appendix D Page 6 channel calculations previously included an input channel depth of 1.5 feet and calculated the actual flow depth to be 1.28 feet. The calculations have been revised to include a channel depth of 2.0 feet. Detail 3/8 shows a 2-foot minimum depth. The channel sideslopes have added to Detail 3/8 for clarification.**

17. Appendix E Page 18, the current peak storage is 0.78' above the channels design. Please review this design and make any necessary corrections.

**BRIDGETON RESPONSE:**

**The channel depth input in the calculation was revised to 2.0 feet in accordance with detail 3 on Sheet 8. The revised calculated flow depth is 1.60 feet which is less than the channel depth.**

18. Figure 1, please show the locations of subcatchments 2S and 3S, as cited in Appendix E, Stormwater Calculations for the West/Southwest Drainage Area. In addition, please show the existing stormwater channels.

**BRIDGETON RESPONSE:**

**The locations of subcatchments 2S and 3S have been added to revised Figure 1 of the revised Report.**

19. Figure 1 and Sheet 1 indicate that part of the settlement bowl is part of the North drainage area. Please verify how this section will flow to the north detention basin without major fill or regrading. If this is incorrectly shown, please verify the HydroCAD results for revised flow areas.

**BRIDGETON RESPONSE;**

**The north and east drainage areas and light duty access road has been revised in the bowl area to allow runoff from the bowl area to drain down the east slope. The drainage area of the north area was reduced by 1.47 acres while the drainage area for the east area was increased by 1.47 acres. Stormwater calculations for both the north and east areas were revised and the results were incorporated into the Stormwater Management Design**

**Report. For the revised east area, a new subarea consisting of 1.47 acres designated as area EA was incorporated into the calculations to model the change.**

20. Sheet 1, please indicate the location of all five outfalls. Outfall #001 is not shown as described in the narrative.

**BRIDGETON RESPONSE;**

**Outfall #001 has been added to revised Sheet 1.**

21. Sheet 2 and applicable drawings, please indicate the approximate culvert inlet and outlet invert elevations.

**BRIDGETON RESPONSE:**

**The culvert inlet and outlet elevations have been added to revised Sheets 3 through 6 and a note has been added to revised Sheet 2 referencing the inlet and outlet invert elevations on Sheets 3 through 6.**

22. Sheet 3, please indicate what the hatched box represents on the existing FML.

**BRIDGETON RESPONSE:**

**The hatched box area has been reviewed in the field and no feature currently exists, therefore the hatch box area has been removed from the engineering plans.**

23. Sheet 5, please provide additional detail where CV-9 is discharging, such as a new outfall and either a lined or earthen channel.

**BRIDGETON RESPONSE:**

**On revised Sheet 5, a note has been added to the outlet of CV-9 requiring construction of a 20-foot wide by 1.5-foot deep parabolic channel at 0.5% slope to an existing drainageway at the edge of woods west of the proposed basin which flows to the north.**

24. Sheet 6, please explain the purpose of the low water stone surface.

**BRIDGETON RESPONSE:**

**The purpose of the low water stone surface is to allow stormwater to overflow the road into the basin for a rare storm event (24-hour 25-year storm) to minimize backwater head build-up in the upslope channel.**

25. Sheet 6, please revise the existing solid waste boundary and solid waste quarry high wall to accurately depict the legend symbols.

**BRIDGETON RESPONSE:**

**The line styles for the existing solid waste boundary and solid waste quarry high wall shown in revised Sheet 6 have been revised to match the line styles shown in the legend.**

26. Sheet 6, please label the location and approximate extents of the existing detention basin.

**BRIDGETON RESPONSE:**

**The location and approximate extent of the existing detention basin northeast of the proposed north detention basin has been added to revised Sheet 6.**

27. Sheet 7 Detail 1, shows the side slopes as 2:1 while the narrative stated 3:1. Please clarify the correct slopes.

**BRIDGETON RESPONSE:**

**Section 2.1.1 of the narrative has been revised to state the north channel sideslopes are 2H:1V.**

28. Sheet 7 Detail 2, please indicate where the Temporary North Channel Crossing will be located on applicable plan sheets.

**BRIDGETON RESPONSE:**

**The locations of the temporary north channel crossings are shown on revised Sheet 6.**

29. Sheet 7 Detail 2, please indicate if there will be a “cushion” separating the twin culverts and the FML.



**BRIDGETON RESPONSE:**

**Sheet 7 Detail 2 has been upgraded to include a geocomposite cushion between the top of the temporary cap and bottom of the twin culverts. In addition, the soil fill around the culverts has been upgraded to 2” to 4” crushed limestone to prevent erosion of the backfill.**

30. Please clarify the correct culvert designs. When comparing the culvert schedule to the HydroCAD data, the following discrepancies were found:

- a) The schedule indicates the invert elevation and slope of CV-2 as 478.5’ and 12.5% respectively while the CAD used 473.5 and 3.75% respectively.
- b) The schedule indicates the slope of CV-5 is 0.2% while CAD used 0.1%.
- c) The schedule indicates the inlet of CV-6 as 456.69 while CAD used 456.6.
- d) The schedule indicates the size of CV-8 as 24” diameter while CAD used 30”.

**BRIDGETON RESPONSE:**

**The response to each part of this comment is addressed below.**

- a) **The invert elevations and slopes used for CV-2 in the calculations and culvert schedule on Sheet 7 are correct with the inlet elevation at 478.50, outlet elevation at elevation at 473.5 and slope at 12.5%. The CV-3 inlet elevation of 473.50 and 3.75% slope are correct.**
- b) **The culvert schedule on revised Sheet 7 for CV-5 slope was changed to 0.10% slope.**
- c) **The culvert schedule on revised Sheet 7 for the CV-6 inlet was changed to 456.60.**
- d) **The culvert schedule on revised Sheet 7 for the CV-8 diameter was changed to 30 inches.**

31. Sheet 8 Details 1 and 5, please discuss in the narrative of when the Eyebrow Diversion Berms and Energy Dissipater for Concentrated Flow Areas will be used and show location on applicable plan sheets.

**BRIDGETON RESPONSE:**

**Section 2 has been revised to include a discussion of when the Eyebrow Diversion Berms and Energy Dissipater for Concentrated Flow Area will be used. Locations of the eyebrow berms will be determined in the field at the time of construction based on the need to protect features such as extraction wells, valves, risers, etc. Similarly, locations for energy dissipaters will also be determined in the field at the time of construction based on the potential for flow to concentrate. One location where the energy dissipater will be constructed is at the southeast corner of the proposed temporary cap as shown in Sheet 3. The locations of the eyebrow diversion berms and energy dissipaters will be included in the Temporary Cap certification report which will be submitted to MDNR. Locations of the**

**eyebrow diversion berms and energy dissipaters installed following construction of the Temporary Cap certification report which will be included in the as-built updates submitted to MDNR quarterly.**

32. Sheet 8 Detail 2, please indicate on the applicable plan sheets where the Detention Basin Overflows will be located per basin and where they will flow to.

**BRIDGETON RESPONSE:**

**The locations of detention basin overflows and discharge flow is shown on revised Sheet 5 for the proposed southwest basin and on revised Sheet 6 for the proposed north basin. The overflow for the proposed southwest basin would flow to the same location as the proposed discharge culvert. The overflow for the proposed north basin would flow to the north into the existing basin like the proposed discharge culvert. No overflow is provided for the proposed east basin because that is a recessed basin without embankment slopes subject to erosion if overtopped.**

33. Sheet 8 Details 6, please verify if the two headers line notations are switched, and that the regrading will be leveling out benches/terraces and not creating them. Please revise this detail.

**BRIDGETON RESPONSE:**

**The two headers line notations have been revised on Sheet 8, Detail 6.**

34. Sheets 2-6, please show the flow direction arrows for all areas, including sheet flow, channel flow, and additional areas outside of the landfill boundary.

**BRIDGETON RESPONSE:**

**Sheets 2 through 6 have been revised to show the flow direction arrows for applicable areas, including sheet flow, channel flow, and additional areas outside of the landfill boundary.**

35. On all applicable sheets, please add the orange fence line layer to the legend.

**BRIDGETON RESPONSE:**

**The orange fence line has been added to the legend of revised Sheets 2 through 6.**

36. Please defend why on areas of the proposed and existing cap liner that the runoff changed to shallow concentrated flow rather than staying as sheet flow.

**BRIDGETON RESPONSE:**

**The TR20 method used by HydroCAD does not allow for sheet flow lengths greater than 300 feet. For the proposed temporary cap, stormwater runoff may continue as sheet flow or concentrate depending on future slopes, settlement, etc. The assumption of using shallow concentrated flow to develop times of concentration in lieu of sheet flow for lengths exceeding 300 feet is conservative because the computed time is lower resulting in greater peak flow.**

37. Appendix B Page 5, North Channels states sideslopes as 2:1 and is earth lined. Please clarify these components. (The narrative and plan sheets had previously stated 3:1 slopes and lined w/ FML)

**BRIDGETON RESPONSE:**

**The sideslopes of the Appendix B Page 5 calculation for the north channel are correct. The Appendix B calculation has been revised to change the manning coefficient from 0.020 to 0.012 for a geomembrane liner and eliminate the reference to earth lining. The changes to peak flow and headwater as a result of this are minimal and have been included in revised Table 2 of the narrative.**

38. Although a large portion of the “watershed” is impermeable, please state if the HydroCAD results for the storm event were calculated on a second day of a rain event to account for saturated conditions of the surrounding grassy areas to account for additional runoff.

**BRIDGETON RESPONSE:**

**As stated in Section 2 of the narrative, the calculations were performed for a 24-hour 25-year frequency storm event with antecedent moisture condition II which is an average moisture condition. Antecedent moisture condition II is the approach typically used for stormwater design calculations.**

End of Comments and Response to Comments