BROWNING MANOR-FINAL DRAINAGE PLAN-with preliminary approved June 5, 2018

13.04.085 Request by applicant for plan review and approval.

A. All requests for drainage plan approval shall be made by the applicant to the drainage board through the county surveyor's office by the presentation to the surveyor of the drainage plan and the supporting data, all in duplicate, by the close of the business day two full weeks prior to the meeting at which approval of the drainage plan shall be sought.

C. Included with the Drainage Plan shall be the following information regarding the applicant that shall be provided on FORM 801. **Provided-signed by Jina Lancaster, Senior/Managing Partner**

13.04.095 Conditions of drainage plan approval.

In order for an applicant to obtain approval of a final drainage plan, the following requirements must be met:

A. The applicant shall be eligible under the terms of this chapter to apply for and obtain drainage plan approval.

B. The drainage plan and supporting submittals required by this chapter shall have been prepared and submitted in a timely and proper manner in accordance with the provisions of this chapter. **Submitted September 17, 2018. Revised October 9, 2018 and October 24, 2018, emails October 13, 16, 22 and 25, 2018**

C. The drainage plan and supporting submittals shall reflect compliance with the requirements of this chapter, and compliance with any conditions of approval applied to the plan by the drainage board. **Required Revisions are shown in red.**

D. The submitted data shall be gathered, analyzed, assembled into the drainage plan and supporting submittals; and shall be certified, and presented to the drainage board all by a civil engineer or land surveyor regularly engaged in stormwater drainage design, and registered to practice in the state of Indiana. **Provided**

E. An easement has been dedicated to house any off-site drainage facilities if such facilities are required to serve the project's stormwater drainage system. **No offsite facilities proposed**

F. The person, persons, partnership, corporation, or other entity to whom approval of the drainage plan is granted must be the person, persons, partnership, corporation, or entity who will be responsible for accomplishing the project for which the drainage plan is developed. **B&L Properties, 9300 Petersburgh Road, Evansville, IN 47725**

13.04.125 Building permits conditioned.

The Vanderburgh County building commissioner shall not allow construction of buildings, or other impervious structures or facilities to commence at the site of a project requiring final drainage plan approval until:

A. Such approval has been expressed by the drainage board;

B. And all storm drainage facilities are constructed.

13.04.130 Phased development of large projects allowed.

Large projects may be divided into phases for the purpose of constructing drainage facilities and obtaining permits in accordance with the requirements of this chapter. **No phasing Proposed**

13.04.140 Information submittal and review schedule.

H. For all new major subdivisions as defined in Title 16 of this code, which major subdivisions are shown to discharge an amount of stormwater in addition to that which is discharged prior to new development and all minor subdivisions, C-0 Through M-3, as defined in Title 16 of this code, which minor subdivisions are zoned for commercial use, and all single parcel commercial and industrial parcels zoned C-0 through M-3 of 2 acres in size or greater that are adjacent to agriculture land use or single family homes, the applicant shall notify all adjoining landowners of the proposed drainage plan. The notification shall also be sent to any Registered Neighborhood Association within 1/4 mile of the proposed development and shall meet the criteria of notification. *Not Provided Provided*

1. The notification shall consist of the following language.

"Notice is hereby given that a Drainage Plan for _____ with a location of _____ has been submitted to the Vanderburgh County Surveyors Office, Room 325, Civic Center, Evansville, IN. The submitted Drainage Plan will be heard for approval or disapproval before the Drainage Board meeting on (date and time) at Room 301 of the Civic Center. A copy of the Drainage Plan is available for review in the County Surveyor's Office during normal business hours."

2. Also included in the notice shall be the name of the developer, name of the landowner where the development is to occur and the name of the engineer/engineering firm that has developed the Drainage Plan.

3. The notification shall occur by certified mail, delivery using approved overnight services providing that the overnight services provide a receipt of delivery or by use of United States Postal Service Certificate of Mailing. All mailings must be made at least 7 days in advance of the scheduled Drainage Board meeting in which the Drainage Plan is to be heard.

4. For new subdivisions in which approval of a preliminary plan is sought under Section 13.04.150 to satisfy certain requirements of the Area Plan Commission (APC), the mailing shall give notice of the

preliminary plan. Once noticed for a preliminary plan, notice will not be required for hearing of the final Drainage Plan unless stated by the Drainage Plan as a condition for approval of the preliminary Drainage Plan.

5. Any required notice under this section may be done in conjunction with notice requirements by the Area Plan Commission provided that the required notice is sent at least 7 days in advance of the scheduled Drainage Board meeting in which the Drainage Plan is to be heard.

13.04.150 Preliminary drainage plan allowed.

Presentation of a preliminary form of the final drainage (Preliminary Drainage Plan) plan may be allowed when the applicant is in need of approval of a preliminary drainage plan to satisfy certain requirements of the Area Plan Commission, and it can be shown that the complexity of the project prohibits the submittal of the final drainage plan within the time limits set by the Area Plan Commission for plan submittals.

For the Preliminary Drainage Plan the notices required under Section 13.04.140 H shall be sent as part of the preliminary plan process. As part of the approval of the preliminary drainage plan the Drainage Board shall determine whether additional notifications shall be required with the submittal of the final drainage plan. ***Board should determine if any additional notification shall occur prior to final drainage plan based upon any public comment.***

13.04.160 Contents of preliminary drainage plan. ***Preliminary Approved June 5, 2018***

A. The contents of the preliminary drainage plan shall include a map based on the most current county planimetric maps, or a topographic map prepared from a more recent aerial photo reconnaissance that provides more accurate data, complete with contour lines, and showing the following:

1. The extent and area of each watershed affecting the design of the drainage facilities for the project; *Undeveloped shown on Undeveloped Subbasins sheet #1 and Developed shown on Developed Basins sheet #2*

2. The soil types based on the most current information available from the SWCD; *Not Provided Provided-soils are a mix of various silt loams that are steep sloped and highly eroded*

3. Zone "A" floodplain based on the current FIRM panels; *Not Provided Provided-none of the area within Zone A*

4. The existing man-made and natural waterways, ponds, basins, pipes, culverts, and other drainage facilities or features within or affecting the project; *The write up states that UN-2 is running off into an existing ditch which is also where Basin 1 is discharging. It is not clear from the contours the location of this ditch. The flow path from the discharge from where the existing lake (proposed Basin #2) to the pipe on proposed lot 3 is not clear. The write up has been revised to state that the flow from both of these basins sheet flows.*

5. The preliminary layout and design of the streets, and all stormwater drainage facilities, including depressed pavements used to convey or temporarily store overflow from the heavier storms, and all outlets for the storm water drainage facilities; *Is there sufficient ROW for Browning/Basin #2? 25' will be platted along Browning in vicinity of Basin 2.*

13.04.250 Inlets. E. Maximum Distance Between Street Inlets. The maximum distance between inlets for street drainage shall be six hundred (600) feet measured in the gutter. Per discussions with County Engineer, in the final Drainage Plan double curb inlet 514 will be changed to a single inlet and an additional inlet will be added at the west intersection of Road 1 and Road 2. Any revisions needed at the east intersection of Road 1 and 2 will be addressed with the road plan approval and Final Drainage Plan.

6. The existing streams, floodways, and floodplains to be maintained, and new channels to be constructed, their locations, cross sections, profiles, and materials used; *The outfalls from pipes 507 and 517 drop into existing drainage draws. These need to be designated as swales and slope information provided. Shown on revised drawing C-101. Designs for these will need to be provided in final drainage plan submittal complete with appropriate erosion control. Swale 4 ends after 106'-it appears that this will then flow into a steep drainage easement down an existing grade. How will the drainage from this swale be handled where it ends. Is it assumed that the swale will sheet flow and if so what erosion control measures will be implemented? Erosion Dissipation is shown.*

7. The proposed culverts and bridges to be built, with the proposed materials to be used; *No bridges, culverts provided*

8. Existing detention basins or ponds within the project, or outside the project but affecting it, to be maintained, enlarged, or otherwise altered, together with any new basins or ponds to be built; and their basis of design; *One existing pond (Basin 2) and one new pond (Basin 1) planned. Existing pond is close to Browning Road. For final drainage plan submittal will need to address that it will meet code and what measures will be done to bring the pond into compliance. Basin 2 shows a 12" pipe with an 8" restrictor plate-for final drainage plan this should be reduced if possible to an 8" pipe (if this will restrict the flow as designed) per revisions of the code 13.04.225 effective 1/1/2018.*

9. The estimated depth and amount of storage required of the basins and ponds, and their available freeboards; *Storage and depth provided. All freeboards will be checked with Section 440 during final review*

10. The estimated location and percentage of impervious surface existing and expected to be constructed at completion of the project; *Building sites shown for townhouses, square footage shown for individual lots*

11. Any interim plan which is to be incorporated into the project pending its completion according to the final Drainage Plan. *None proposed*

12. A copy of the Notice of Public Hearing as required by the Area Plan Commission and under Section 13.04.140 H of the Vanderburgh County Drainage Code with a copy of the returned receipts from all certified mailings or proof of Certificate of Mailing. *Not Provided Provided*

B. Notations and Explanations on the Preliminary Plan. All notations necessary to indicate the existing conditions, and the proposed functions of the various features shown thereon; and shall include the following.

C. Geographic Orientation Required. A north arrow, scale, location insert, and other information necessary for geographic clarification shall be included on a preliminary plan. *All provided. Scale at 1"=50'*

D. Data Required to Accompany Preliminary Plan. Descriptive data sufficient to support the feasibility of the preliminary drainage plan with regard to the requirements of this chapter, including calculations of the predevelopment and post development runoff rates using rainfall data supplied herein shall accompany a preliminary drainage plan. *Provided*

E. Recommendation of Preliminary Plans Restricted. No preliminary drainage plan shall be deemed to meet the requirements of the drainage code by the technical advisors to the Drainage Board unless the preliminary drainage plan shall be a workable plan according to the same criteria as, and capable of being incorporated into, a final drainage plan. *Area 14, located on the north, is proposed to leave undetained. This area is just under 4 acres and will not meet the criteria as established regarding undetained areas. The Developer will need to addresses this to the Board with a variance request. Should the Board allow this undetained area to exist what guarantees will be provided to insure no future clearing and additional runoff to this area? A variance has been requested along with a proposal to create an easement for trees. Final language for the easement will need to be addressed with the County Attorney prior to approval of Final Drainage Plan.*

Area 13 (1.76 acres-all or portions of 4 lots) are proposed to drain undetained to the south into an existing lake. The flows from areas 1, 2, 15 and 16 flow to Basin #2 contain only 1.53 acres combined. It is proposed to decrease the flow from Basin #2 to account for the increase in flow from Area 13. Both areas will drain into a pipe that flows south off property. As with Area 14, the calculations assume that 1.4 acres will remain wooded-what provisions will be proposed to insure that this is not altered/developed? A 75' easement for trees has been proposed for this area.

Will the existing Basin (#2) meet the criteria of the County Drainage Code with the close proximity to its location to Browning Road? 10' Maintenance is shown outside of Road ROW

F. Determination of Sufficiency. The drainage board shall decide the sufficiency of the preliminary drainage plan, and any conditions or additional requirements to be applied to the preliminary drainage plan. *Additional easements are needed as follows: Lot 8 Pipe 517 outside of ROW and the drainage down to the proposed DE feeding to the DE that houses proposed Swale #6. Pipe 539 (outlet of Basin #2)*

and the flow path from the outlet to where the drainage leaves the property. An easement is required from the outlet of Basin #1 to where it will leave the project. Shown on revised Drawing C-101

OTHER COMMENTS

It should be noted that the PUD for the single lot is not zoned at this time. The proposed drainage plan shows 18 lots for the townhouse area (PUD area), while the proposed plat only shows a single lot.

13.04.165 Contents of final drainage plan.

The contents of the final Drainage Plan shall include all the items listed above for a preliminary drainage plan, plus:

A. Soils Map. A soils map indicating soils names and their hydrologic classification must be provided for a proposed project; **Provided in Preliminary**

B. Location and Topographic Map. In addition, a location and topographic map must be provided showing the land to be developed, and such adjoining land whose location and topography may affect or be affected by the layout or drainage of the project. The map must also identify all adjoining landowners. **Not provided-Provided revised drawing C-101** The contour intervals shown on the topographic map shall be two and one-half feet for slopes less than four percent; and five feet for slopes four percent or greater; or best available; **1'**

C. The location of streams and other stormwater conveyance channels, both natural and man-made; and the vertical and horizontal limits of the one hundred (100) year floodplain, according to FIRM panels, and/or the Building Commissioner; all properly identified; **Provided**

D. The normal shoreline of lakes, ponds, swamps, and basins, their floodplains, and lines of inflow and outflow; **Provided**

E. The location of existing regulated drains, farm drains, inlets and outfalls; **No regulated drains**

F. The location of the following existing storm and water features:

1. Storm sewers and easements; **Provided**

2. Sanitary sewers and easements; **Existing sewer just north of south property line of project Does easement require approval of EWSU in order to construct through the easement? Pipe moved in revised plan**

3. Combined sewers and easements; **None located on site**

4. Water lines and easements; **Provided**

and outfalls to any of the above as applies;

G. Wells, septic tank systems, and outfalls, if any; **Per submittal, none known**

H. Seeps, springs, sinkholes, caves, shafts, faults, or other such geological features visible, or of record; **Per submittal, none visible or of record**

I. The limits of the entire proposed project and the limits of the expected extent of land disturbance required to accomplish the project; **The discussion state roughly half of the property will be disturbed with several areas of trees to remain**

J. The location of the streets, lot lines, and easements; **Provided**

K. A scale, preferably one inch equals fifty (50) feet; **varies-1"=50**

L. An arrow indicating North. **Provided**

M. On-Site Bench Mark Required. A benchmark is required to be located within the project limits. Approved datum shall be found within the most recently approved Technical Memorandum. **Noted on existing SSMH**

N. For all non residential Major Subdivisions and all Minor Subdivisions C-0 through M-3 **(Not Applicable-Residential Subdivision)**

13.04.170 Final drainage plan layout.

A. In addition to the requirements listed for a preliminary drainage plan, the final drainage plan shall depict the following:

1. The extent and area of each watershed tributary to the drainage facilities within the project; **Provided**

2. The final layout and design of proposed storm sewers, their inlet and outfall locations and elevations, the receiving streams or channels; all with the basis of their design;

No outlet elevation is shown for the 12" HDPE pipe between lots 6 and 7. The upstream end of this pipe is 6.9' deep at the yard drain. If the pipe is installed at this depth through the entire run of the pipe, a wider easement could be needed based on section 13.04.245 of the drainage ordinance. No end section is provided on this HDPE pipe. Provided Is a pipe anchor going to be provided so that the outlet end matches the elevation of the 4'x20' energy dissipater? If some type of anchor is going to be used, provide details. Provide a detail for the yard drain. Is this a Nyloplast type structure, or is it going to be a concrete box? Is the existing 12" RCP located next to the proposed location of the HDPE pipe going to be removed? Provided Provide details of the energy dissipater. Drawing C-108

Is there a pipe 515? It is shown on the drawing provided by the USACE to the County. Per discussions the storm sewer system is P505 to P507, P511 and P513. There is some HDPE pipe

shown where P505 ties to P507 that is to essentially carry overflow that was required by IDEM. The engineer does not believe this pipe will carry any flows but was installed in order to meet IDEM requirements.

3. The location and design of the proposed street system, including depressed pavements used to convey or detain overflow from storm sewers and over-the-curb runoff resulting from heavier rainstorms, and the outlets for such overflows; all with their designed elevations; Overflow swales required between lots 6 and 7, and at the south side of curb inlet 530. Provided

4. The locations, cross sections, and profiles of existing streams, floodways, and floodplains to be maintained, and the same for all new channels to be constructed; Provided

5. The materials, elevations, waterway openings, size, and basis for design of the proposed culverts and bridges; No bridges proposed. Design of culverts provided.

6. Existing ponds and basins to be altered, enlarged, filled, or maintained; and new ponds, basins, swales, to be built, and the basis of their design; Provided-will the existing trees be removed to meet code requirements? Per the discussion they will be removed

7. The location and percentage of impervious surfaces existing and expected to be constructed; used average lot information for all calculations.

8. The material types, sizes, slopes, grades and other details of all the stormwater drainage facilities; Provided

9. The estimated depth and amount of storage required in the new ponds or basins, the freeboard above the normal pool and highwater pool of wet basins, and details of the emergency overflows from the basins; Provided

10. For all controlled release basins, a plot or tabulation of the storage volumes with corresponding water surface elevations, and a plot or tabulation of the basin outflow rates for those water surface elevations; Provided

11. The location of any applicable "impacted drainage areas" or other areas designated to remain totally undisturbed, natural, or for common and/or recreational use. Not Provided What areas are not to be disturbed as required by USACE? Shown on resubmitted Drainage Plan Map C-101

12. The location of Drainage Easements for retention/detention basins, drainage ditches/swales, storm sewers, junction boxes, inlets, or manholes outside of any county right of way. Easements dimensions must be shown on each individual lot to the extent that they can be recreated in the field within the lot boundaries of said lot. Provide dimensions for Tree Easement on lots 105 and 114. Provided Pipes 525 and 539 (outlet from basins) are not entirely in an easements They are in the Drainage Easements

Drainage Easements will not be required for retention/detention basins, drainage ditches/swales, storm sewers, junction boxes, inlets, or manholes in the following situations: **Multiple lot residential-easements required.**

B. Protection of Structures From One Hundred Year Flooding. All structures to be occupied as residences or businesses shall have finished floor elevations two feet above the high water calculated to occur during a one hundred (100) year return period storm for the subject building site; and the required floor elevations shall be depicted on the plan drawings for such affected sites. **No homes within this section shown to be within 100 year flood plain**

13.04.175 Submittal of a written drainage design report.

The final drainage plan shall be accompanied by a written report containing the following:

A. Any significant stormwater drainage problems existing or anticipated to be associated with the project; **Swale #8 is 15% grade and Swale 10 is at 24.24%-what precautions will be taken with high velocity flow-show that rip rap on this constructed swale will hold or provide alternate cover. If riprap is used, provide a detail showing riprap keyed into the swale side slopes and bottom. The cross sectional area of the swale required to convey the design flows must be maintained after placement of the riprap. Provided calculations**

The plan makes assumptions regarding leaving tree easements in lieu of the construction of basins and to allow for natural filtration and slow down of runoff. Per the 13.04.160E of the preliminary drainage plan requires the submittal of the plat language for approval by the County Attorney. Provided-some changes will be required which will be noted

What method will be used to ensure that the tree easements are not disturbed; will the easements be marked similar to a conservation easement? No plans to do any special marking As the drainage plan was submitted to the USACE will they require any special language regarding the tree easements? USACE did not require

Lots 1-6 in the preliminary drainage plan were to have a 75' tree easement per the approved preliminary drainage plan-this has been reduced to 45'. Please address. Addressed in revised commentary; reduction at the south side is due to EWSU easement. The actual northern line has not changed significantly.

USACE in an email to the County Surveyor provided a copy of sheet C-102 Drainage Plan-this sheet is not the same as was provided to the County and shows a stream that is not to be disturbed and additional pipe structure-please address these issues-see note under 13.04 170A2. Addressed

The plan shows that two ADS water quality units are to be installed. Discuss the basis for the proposed installation of these units. How these units are to be maintained as this is not a function of the County? Revised plan eliminated the water quality units

B. The analysis procedure used to identify and evaluate the drainage problems associated with the project; **Rational**

C. Any assumptions or special conditions associated with the use of the procedures, especially hydrologic or hydraulic methods, used to identify and evaluate drainage problems associated with the project; **None noted**

D. Discussion of any permits applications submitted or proposed to be submitted to state and/or federal agencies that will affect the timing and/or construction of the Drainage Plan such as but not limited to United States Corp of Engineers 404 permits (both individual and nationwide), Indiana Department of Environmental permits (401 Water Certification and others), Indiana Department of Natural Resource Permits (Construction in Floodway) and any approvals that may be required to discharge to Indiana State Highways. The report should state the status of the application of such permits. For permits that have been approved, copies of the approval document shall be included with the Drainage Design Report including any conditions on approved permits that could affect the implementation of the Drainage Plan;

Per email dated October 9, 2018 the following information was provided:

"The Corps and IDEM should have all the information they need to be able to authorize the RGP permit.

Section 7 review by USFWS has been conducted and concluded that this project is not likely to have significant effect on federally endangered, threatened, and rare species assuming any further clearing will occur outside of bat season which is from April 1 - October 15th. The Corps will add this condition to the RGP permit.

Regarding Section 106 review for cultural resources, they also concluded the project is not likely to affect any cultural resources."

Provide narrative with the following information: Order(s) regarding shutdown of the site, requirements of USACE and other agencies regarding permitting requirements, final copy of approval from USACE (general permit and any conditions regarding the site). Copies of any permit/conditions from IDEM. Provided emails

E. The proposed design of the drainage control system; **Provided**

F. The results of the analysis of the proposed drainage control system showing that it does solve the project's identified and anticipated drainage problems; **Pending USACE Approval Provided in emails**

G. A detailed description, depiction, and log of all hydrologic and hydraulic calculations or modeling, and the results obtained thereby; together with the input and output files for all computer runs; **Provided**

H. Maps showing individual drainage areas within the project subdivided for use in the analysis thereof. **Provided**

13.04.180 Typical cross sections of drainage facilities.

One or more typical cross sections must be provided for each existing and proposed channel, basin, pond, or other open drainage facility which cross sections:

A. For existing and proposed detention and retention basins and ponds, a minimum of two cross sections per basin with the cross sections being 90 degrees from each other. The cross sections shall show the following: **Provided.**

Minimum bottom of the basin, Pool Elevation (wet basins), side slope of the basins including above and below normal pool elevation for wet basins, elevation of water at designed storm, elevation of water at 100 year storm, elevation (bottom) of emergency spillway and elevation of outflow of 100 year storm within emergency spillway, elevation of existing land immediately adjacent to the basin, proposed surrounding topography including required maintenance pathway of new basins, fencing (if provided) and any easements or obstructions that are intersected by the cross section. **Show details of pipe outlet where it discharges across the existing sewer and any planned erosion control for the emergency spillway on Basin 1. Cross section should also show outlet pipe and elevation of existing sewer line along with any required separation between lines. Basin revised and pipe no longer crosses line**

B. For existing ditches and streams – sufficient typical cross sections that capture the existing channel throughout the project area. The cross sections shall show the existing configuration and existing land immediately adjacent to all drainage facilities as well as any easements, property lines or obstructions that are intersected by the cross section. For all existing ditches a bottom profile line must also be provided. The profile line shall also show any existing structures (culverts, bridges, and other crossings), location of crossing utilities or other obstructions within the ditches or streams. **Provide profile lines for two existing steep channels (the one noted on the plan where proposed swale 7 is to be located and the existing channel located between lots 6 & 7). Provided**

C. For new channels and swales – sufficient typical cross sections that capture the proposed configuration of new channels and swales throughout the project area. The cross sections shall show the proposed configuration of the channels and swales and existing land immediately adjacent to all drainage facilities as well as any easements, property lines or obstructions that are intersected by the cross section. Also a bottom profile line must also be provided. The profile line shall also show any existing structures (culverts, bridges, and other crossings), location of crossing utilities or other obstructions within the ditches or streams. **Provided**

D. For large projects and subdivisions which will contain multiple swales, a typical cross section of the swale may be provided combined with a swale table listing each swale. The swale table shall include the slope of each swale (in lieu of profile), depth of water at designed storm and type of erosion control to be utilized on the channel bottom and side slopes. **Provided**

E. Typical Cross sections shall be provided in the following situations where proposed excavation is proposed against no controlled properties: **None shown**

1) for any cut that is proposed within 15' of a property line and the cut is 4' or greater and where such cut is not part of an excavation for a channel or swale.

2) the location of any proposed retaining walls greater than 4' within 15' of a property line.

13.04.350 Grass mix matched to site conditions.

The choice of grass mixture for stabilizing open channels shall be based upon specific site conditions such as shade and sun tolerance, velocity tolerance, and waterway maintenance requirements. The proposed seed mixture to be utilized for stabilizing open channels shall be included in the approved Drainage Plan. **Tenbarge Green Alliance**

13.04.440 General detention/retention basin design requirements.

The following design principles shall be observed for detention and retention basins:

A. Dry detention facilities designed to become a permanent part of the stormwater drainage system shall be installed with an additional ten (10) percent capacity to allow for sediment accumulation resulting from development, and to permit the pond to function for reasonable periods between cleanings. **Wet basin**

B. Depth of Stored Water. The maximum depth of stormwater to be stored, without a permanent pool shall not exceed four feet; and the maximum depth of stormwater to be stored above a permanent pool shall not exceed four feet. **See Basin Design Chart-Meets code**

C. Finished Floor Elevations Adjacent to Basins. The lowest floor of any building or structure occupied by humans must be at least two (2) feet above the one-hundred (100) year storm water elevation of detention/retention basins. **See Basin Design Chart-Need to address on Lot 1 adjacent to Basin 2 Elevation provided**

D. Earthen Side Slopes 4:1 Maximum Steepness for Basins. All detention and retention basins with grassed, earthen side slopes shall have side slopes no steeper than four horizontal units of measurement to one vertical unit of measurement (4:1) to the base of dry basins, and to the typical low waterline of wet basins. **Meets code**

E. Riprap Side Slopes 2:1 Maximum Steepness for Basins. Wet retention basins with riprap armored side slopes shall have slopes no steeper than two horizontal units of measurement to one vertical unit of measurement (2:1) at any point in the side slope. **No rip rap proposed**

F. Riprap to Extend Two Vertical Feet Below Waterline. The armored portion of the side slope must extend to a minimum depth below the permanent pool elevation of two vertical feet. **No rip rap proposed**

G. Underwater Earthen Side Slopes 2:1 Maximum Steepness. Nonarmored earthen side slopes shall have slopes no steeper than two horizontal units of measurement to one vertical unit of measurement from a point two vertical feet below permanent pool, thence downward. **Meets code**

H. Safety Ledges and/or Fencing of Wet Basins. Safety fencing surrounding the basin, and/or shallow safety ledges shall be provided if deemed necessary by the design engineer or the developer. **County will not comment on this issue-developer needs to determine if this should be required**

I. Outlet Controls to Operate Automatically. Outlet control structures shall be designed to operate as simply as possible, and shall require little or no maintenance for proper operation. **Pipe and open spillway Pipe in Basin 2 is shown as 12" with 8" orifice-this needs to be changed to 8" pipe per code requirements. Revised.**

No end sections are shown on either end of the basin #2 outlet pipe. Pipe anchors will be needed in order to ensure that the ends of the pipe do not deflect over time. Provided

Is any type of permanent erosion control measure required at FES 526 at the outlet of basin #1? Shown on drawing C-101

J. Designed Water Level Control Required. A controlled positive outlet shall be required to maintain the designed water level in wet basins, and provide the required detention storage above the designed low water level. Wet basins with greater than 0.5 acres of surface area at normal pool shall have a minimum depth of 6 feet over 50% of the basin area and no extensive shallow areas shall be allowed except as required for the safety ledge. **A variance was requested and approved for Basin #2 as part of the Preliminary Plan Approval**

K. Emergency Spillway Requirements.

1. An emergency overflow spillway shall be provided for the release of storm runoffs exceeding the designed maximum detention volume, or all overflow volumes in emergency conditions, should the normal discharge devices become totally or partially inoperative.

2. A minimum freeboard of one-half foot above the calculated elevation of the design storm detention high water level to the elevation of the spillway flowline peak is required as a safety factor for all basins. **See chart-may need to slightly adjust spillway and adjoining elevations Provided**

3. The emergency overflow spillway shall be clearly marked with a defined weir, either grass, rip rap or paved. The emergency overflow spillway velocities shall be calculated and the necessary erosion control materials shall be specified and utilized in the construction of the overflow spillway and receiving stream. Energy dissipation measures must be employed where required. **Provided**

L. Automatically Operating Emergency Spillway Required. The emergency overflow spillway shall be designed so that it operates openly, automatically, does not require manual attention, and will pass all the

one hundred (100) year return period storm flow with a one-half foot vertical minimum above the one hundred (100) year return storm flow to the lowest dirt elevation in the surrounding earthwork. **See Basin Design Chart**

M. Dry Detention Basin Criteria. **Wet Basin**

N. Side Slopes to Remain Stable. All side slopes of a basin shall be constructed stable and shall be maintained in a stable condition by the same criteria as specified herein for open channels. **Tenbarge Green Alliance**

O. Wet Basin Cover and Maintenance. The earthen side slopes of wet basins shall be provided with grass cover above the low water elevation, which shall be maintained equal to turfed residential lawns, and in no case shall the cover growth exceed twelve (12) inches in height, or the most current county standard. **Tenbarge Green Alliance-Plan revised to utilize native grasses. Provide information on types of grasses and maintenance. Provided**

P. Maintenance Pathway for Basins. A flat pathway with a minimum width of ten (10) feet shall be constructed completely around the top of the embankment of all detention/retention basins. **Provided**

Q. Maintenance Easement for Basins. An easement dedicated for the purpose of accessing and maintaining the basin and its appurtenances shall be provided, and the easement shall be configured so that it includes the entire basin, the entire earthwork encompassing the basin, the maintenance pathways into and around the basin, and all inletting and outletting appurtenances of the basin. The basins and maintenance easements shall not be located with the right of way of any county, state or federal road or highway. For all basins at least one easement of at least 10' in width must be provided to access the basin from a public roadway for the purpose of maintaining the basin. **No LMSDE to basin is provided to Basin 1. Provided** For subdivisions in which no public roadway is to be dedicated the easement must be to the nearest private road or public road.

R. Maintenance Report Required for Basin. **Provided**

1. A brief and concise report shall be prepared, by the design engineer, consisting of a description of the location, intended function of all parts appurtenant to the basin, together with a description of the ways in which the basin and its appurtenances should be maintained, all worded in language easily understood by residential or commercial property owners; and

2. The maintenance report for all subdivisions or summary of the report shall be included on the plat or shall be referenced on the plat to its location as part of the drainage plan.

S. Copy of Report Must be Submitted With the As-Builts or Record Drawings. A copy of the maintenance report described above shall be included with the as-built plans or Record Drawings required to be submitted hereinabove.

T. No tree limbs, trunks, refuse from legally burnt vegetation, nor construction waste, demolition materials, or other man made material may be buried within the area in which an impounding structure will be located. Notice shall be placed on construction drawings noting the prohibition to the burying of any such materials. Certain natural materials such as large rocks may be located in the bottom of wet basins in order to provide fish habitat or habitat breeding areas provided that such materials are not included within the calculations for required storage volumes and will not block outlet structures. **Note needs to be placed on plans**

U. For small sites of less than 5 acres, infiltration trenches may be utilized instead of a wet or dry basin. In utilizing an infiltration trench, the storage volume is equal to the void ratio multiplied by the total volume of the trench. Information must be provided in advance validating the void ratio as well as testing proposal to validate the void ratio. The infiltration trench must have an outlet that restricts the flow per code provisions. **Not Applicable**

V. No retention basin shall be allowed within the flowline of a Regulated Drain of Vanderburgh County. The County Drainage Board cannot use its rights to discretionary decisions granted under Section 13.04.025 to exempt this restriction. **No regulated drain within project**

13.04.460 Responsibility for drainage facility maintenance.

The installation, maintenance, repair, and replacement of all stormwater drainage facilities, and erosion and siltation control measures for a project during the period of construction, and until final approval by the county engineer, shall be the responsibility of the land developer(s), and/or the property owner(s) of record. **Provide information regarding the proposed maintenance of the native grasses around Basin 2. Is the future owner of Lot 1 going to be made aware of their obligations on how to maintain the native grasses? How will the buyers in the subdivision be made to understand that the area is not be mowed but to grow wild? Plan is to mow twice per year. Native grasses not required so area may eventually change to cool season grasses.**

The assignment of responsibility for the maintenance and repair of all stormwater drainage systems and facilities outside of county accepted road rights-of-way after the completion of the project, and final approval thereof by the county engineer, shall be determined before the final drainage plan is approved; and shall be documented by appropriate covenants and restrictions applied to the subdivision and to the property deeds thereof, and shall be printed clearly upon all recorded plats of the project. **Plan B to be utilized**

GENERAL COMMENTS

The area of the tree easements on lots 12 and 114 was increased from the preliminary plan and a tree easement was added on lot 13

BASIN DESIGN CHART-Review				
		Basin 1	1 Revised	Basin 2
1	Design Capacity	20,919	15,088	3790
2	(Section A) Dry detention facilities designed to become a permanent part of the stormwater drainage system shall be installed with an additional ten (10) percent capacity to allow for sediment accumulation resulting from development, and to permit the pond to function for reasonable periods between cleanings; (#1 x 1.1)	22,057	16,497	4692
3	Normal Pool Elevation or dry basin bottom elevation	453	453	499.5
4	Storage elevation at 25 year storm (50 year for State Highway 100 year for impacted area)	455.1	455.05	500.16
5	(Section B) Depth of Stored Water. The maximum depth of stormwater to be stored, without a permanent pool shall not exceed four feet; and the maximum depth of stormwater to be stored above a permanent pool shall not exceed four	2.1	2.05	.66
6	Elevation of emergency spillway	455.2	455.2	500.3
7	Q100	31.09	25.8	6.12
8	Depth of flow through emergency spillway at 100 year storm	.3	0.3	.2
9	Flow line at 100 year storm #6 +#8	455.5	455.5	500.5
10	(Section K2) A minimum freeboard of one-half foot above the calculated elevation of the design storm detention high water level to the elevation of the spillway flowline peak is required as a safety factor for all basins. #9-#4 ≥ 0.5	.4	0.45	.34 Okay
11	Elevation of top of bank	456	456	501
12	(Section L) Automatically Operating Emergency Spillway Required. The emergency overflow spillway shall be designed so that it operates openly, automatically, does not require manual attention, and will pass all the one hundred (100) year return period storm flow with a one-half foot vertical minimum above the one hundred (100) year return storm flow to the lowest dirt elevation in the surrounding earthwork. (#11-#9 ≥ 0.5')	0.5	0.5	0.5
13	Elevation of home adjacent to basin	NA	NA	Not Provided-Provided
	(Section C) Finished Floor Elevations Adjacent to Basins. The lowest floor of any building or structure occupied by humans must be at least two (2) feet above the one-hundred (100) year storm water elevation of	Basin in Valley		