

CAYMAN RIDGE

SECTION 4

PHASE 1



CASH WAGNER

& ASSOCIATES, PC

CONSULTING ENGINEERS • LAND SURVEYORS

February 25, 2015

Vanderburgh County Drainage Board
Civic Center Complex - Room 305
Evansville, IN 47708

**RE: Cayman Ridge - Section 4, Phase 1
Variance Request
Project No.: 14-1948**

On behalf of the owner, Jagoe Homes, Inc., we request a variance to allow homes to be constructed within 10 feet of the lake maintenance and storm drainage easement for Detention Basin #1 within Cayman Ridge Subdivision.

If you have any questions or require additional information, please contact our office.

Sincerely,

Glen Meritt, Jr.
Project Engineer

cc: File

W:\141948\Civil\Drainage\Drainage Variance Ltr.doc

Approved by the Vanderburgh County Drainage Board on this 3rd day of MARCH, 2015.

Bruce Ungethiem, President

Stephen Melcher, Vice President

Joe Kiefer, Member

414 CITADEL CIRCLE, SUITE B
EVANSVILLE, IN 47715

RECEIVED BY THE
VANDERBURGH COUNTY
SURVEYORS
AD 2/25/15
PH: 812.401.5561
FAX: 812.401.5563

Cayman Section 4 Phase 1-FINAL DRAINAGE PLAN

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. **Final Drainage Plan submitted on 2/20/2015 Revisions Submitted 2-27-2015**
- 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. **Sheets 1 and 2 are not certified Submitted revisions certified**
- 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 Easements Required**
- 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. **Jagoe Homes, Inc., 3624 Wathens Crossing, Owensboro, KY 42301, 1-270-684-0639**

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. **See comment under Section 13.04.130**

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. **Please describe if all facilities**

will be constructed prior to the construction of any buildings or if the project is to be phased. If the project is to be phased, please describe what facilities will be constructed prior to proceeding forward. Will need to address the handling of drainage across lot 314 and 315; see comment under 13.04.175 A Per submittal notes, all infrastructure to be constructed prior to any home construction. Phase 1 will be constructed at one time.

13.04.165 Contents of the 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. Larger detailed map supplied for Phase I area

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. Provided

C. Contour Intervals.

1. 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'

Contours

2. 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; . FIRM Map provided-does not show any section of the this phase of the subdivision within 100 year zone

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

4. The location of exiting regulated drains, farm drains, inlets and outfalls; **Not addressed One existing field drain is located on lot 307**

5. Storm, sanitary, and combined sewers, and outfalls; **No Combined sewers-Sanitary not provided in Surveyors Set Provided**

6. Wells, septic tank systems, and outfalls, if any; **Not addressed Per revision notes, none located within project limits**

7. Seeps, springs, sinkholes, caves, shafts, faults, or other such geological features visible, or of record;. **Not addressed Per revision notes, none located within project limits-see also**

Drawing C-109 SWP3 Narrative

8. The limits of the entire proposed project and the limits of the expected extent of land disturbance required to accomplish the project
9. The location of the streets, lot lines, and easements; Provided
10. A scale, preferably one inch equals fifty (50) feet; 1"=50'
11. An arrow indicating North. Provided

D. On-Site Bench Mark Required. A benchmark determined by "Mean Sea Level Datum 1929," is required to be located within the project limits. None Shown TBM shown on Drawing C-101

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; Provided
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; 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; It is not clear where swale 4 ends and 5 begins, likewise for 5 and 6 and also 1A and 1B. Note on plans that swale 2 must be sod per code.
5. The materials, elevations, waterway openings, size, and basis for design of the proposed culverts and bridges; 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 One existing basin. Long term plan is to expand the basin, but for this phase of the subdivision the existing basin is shown to handle the required storage.
7. The location and percentage of impervious surfaces existing and expected to be constructed; Provided
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-outflow for 25 year developed 124 cfs

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. None shown

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. Elevation not provided
Not required-homes not in 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; The Preliminary Drainage Plan indicated an existing USCOE jurisdictional waterway that flows west to east through the northern portion of the project. This stream is to be relocated. A preliminary layout of the relocation was provided. This jurisdictional waterway appears to run through Lots 314 and 315. It is understood that once approval for the stream location is approved and a relocated stream is constructed that the existing stream may be filled. Until such time, the issue will be how will water from swale #3 be handled as the drawings show this swale to be constructed over presumed fill over the stream on lots 314 and 315? See expanded discussion in site description which addresses this issue.

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; Provided

D. The proposed design of the drainage control system; Provided

E. The results of the analysis of the proposed drainage control system showing that it does solve the project's identified and anticipated drainage problems; Provided

F. 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**

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

13.04.180 Typical cross sections of the 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 Existing Basin

A. Must show the elevation of the existing land immediately adjacent to all drainage facilities;

B. Must show the high water elevations adjacent to all waterways and impoundments as expected from the one hundred (100) year storm in relationship to permanent structures

13.04.440 General detention/retention basin design requirements.

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

A. Duration of Storage. The maximum volume of water stored and subsequently released at the design release rate shall not result in a storage duration in excess of forty-eight (48) hours, unless additional storms occur within the period **Not provided Provided-meets code**

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. 4.13' slightly exceeds 4' max-note it is close to requirement; once basin is expanded in the next phase this will not be an issue

C. Basin Distance From Dwellings. All stormwater detention facilities shall be separated by not less than fifty (50) feet from any building or structure to be occupied by humans. **Unless a Variance is requested, no building may be built within 50' of the lake Variance Requested**

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. Existing Basin

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 measurements to one vertical unit of measurement (2:1) at any point in the side slope. Existing Basin

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 Existing Basin

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 measurements from a point two vertical feet below permanent pool, thence downward. Existing Basin

H. Minimum Depth of Riprap Application. Riprap side slope armor shall be a minimum twelve (12) inches in depth at all points of application. Existing Basin

I. Drain Recommended for Maintenance of Wet Basins. If possible, a drain should be installed to lower the pool of wet basins to a level sufficient to repair any wave action erosion along the waterline, and to perform other periodic maintenance. Not provided nor is it required

J. 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 board. Existing Basin

K. 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. No controls

L. 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. Existing Basin-provided

M. 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. Existing Basin

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. Existing Basin

N. 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. Existing Basin

O. All Permanent Pools Require Water Quality Provisions. Designers of basins with permanent pools shall consult available manuals from the soil and water conservation district, and incorporate provisions therefrom for maintaining water quality, safety, and soil stability. Existing Basin

P. Dry Basin Cover and Maintenance. Dry basins shall be planted and maintained in vegetative cover equal to that of residential lawns Wet Basin, not applicable

Q. 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. Existing Basin

R. 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 Existing Basin

S. 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. There appears to be sufficient space to maintain.

T. 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. Provided

U. Maintenance Report Required for Basin.

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; **Not Provided-** was this included with Section 1; if not one needs to be provided for remaining lots attached to the basin in this and future phases per submittal notes, included in Section 1

2. The report shall be attached to the restrictions for the property on which the basin and its parts are located.

3. Such restrictions shall be shown to exist prior to the board's final approval of the drainage plan for a project whose plans include a basin. The drainage plan is being prior to final plat. See note under 13.04.460.

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

W. Elevation of Dry Basin Bottom Marked. A continuous concrete liner at least equal in characteristics to that described in Section 13.04.315F shall be installed in all dry basins from the point of inflow of each channel entering a basin to the point of outflow from the basin. The concrete liner shall be installed at an elevation slightly lower than the earthen floor of the basin, so that it may serve as a trickle trough or low flow liner. Wet Basin, not applicable

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.

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.

The Drainage Plan needs to address whether a Plan A (Lot Owners) or Plan B (Repair Fund held by County) will be utilized. To utilize Plan B repair fund.

The Drainage Plan does not show the drainage easement that was previously platted on lots 321-323; will a request to vacate this easement be submitted and if so what is the timing for that submittal? Per submittal notes, the drainage easement on these lots will be vacated under separate submittal

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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. **Sheets 1 and 2 are not certified** *See attachments*

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 Easements Required**

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. **Jagoe Homes, Inc., 3624 Wathens Crossing, Owensboro, KY 42301, 1-270-684-0639**

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will be constructed prior to the construction of any buildings or if the project is to be phased. If the project is to be phased, please describe what facilities will be constructed prior to proceeding forward. Will need to address the handling of drainage across lot 314 and 315; see comment under 13.04.175 A

All infrastructure will be constructed prior to any home construction. Phase I will be constructed at one time.

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

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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. **Provided**

C. Contour Intervals.

1. 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'

Contours

2. 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; . **FIRM Map provided-does not show any section of the this phase of the subdivision within 100 year zone**

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

4. The location of exiting regulated drains, farm drains, inlets and outfalls; **Not addressed** *One existing field drain is*
5. Storm, sanitary, and combined sewers, and outfalls; **No Combined sewers-Sanitary not provided in Surveyors Set** *located on Lot 307.*

6. Wells, septic tank systems, and outfalls, if any; **Not addressed** *None located within project limits.*

7. Seeps, springs, sinkholes, caves, shafts, faults, or other such geological features visible, or of record;. **Not addressed** *None located within project limits.*

8. The limits of the entire proposed project and the limits of the expected extent of land disturbance required to accomplish the project

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

10. A scale, preferably one inch equals fifty (50) feet; **1"=50'**

11. An arrow indicating North. **Provided**

D. On-Site Bench Mark Required. A benchmark determined by "Mean Sea Level Datum 1929," is required to be located within the project limits. **None Shown** *TBM #1 added*

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; **Provided**

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; **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; **It is not clear where swale 4 ends and 5 begins, likewise for 5 and 6 and also 1A and 1B. Note on plans that swale 2 must be sod per code.** *Between flowing elevations shown.*

5. The materials, elevations, waterway openings, size, and basis for design of the proposed culverts and bridges; **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 **One existing basin. Long term plan is to expand the basin, but for this phase of the subdivision the existing basin is shown to handle the required storage.**

7. The location and percentage of impervious surfaces existing and expected to be constructed; **Provided**

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-outflow for 25 year developed 124 cfs**

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. **None shown**

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. **Elevation not provided**

*Not in
100-year
flood.*

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; **The Preliminary Drainage Plan indicated an existing USCOE jurisdictional waterway that flows west to east through the northern portion of the project. This stream is to be relocated. A preliminary layout of the relocation was provided. This jurisdictional waterway appears to run through Lots 314 and 315. It is understood that once approval for the stream location is approved and a relocated stream is constructed that the existing stream may be filled. Until such time, the issue will be how will water from swale #3 be handled as the drawings show this swale to be constructed over presumed fill over the stream on lots 314 and 315?**

*Swale #3 will discharge
into the exist. ditch on the
north side of
Lot 313.*

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; **Provided**

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

E. The results of the analysis of the proposed drainage control system showing that it does solve the project's identified and anticipated drainage problems; **Provided**

F. 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**

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

13.04.180 Typical cross sections of the 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 **Existing Basin**

- A. Must show the elevation of the existing land immediately adjacent to all drainage facilities;
- B. Must show the high water elevations adjacent to all waterways and impoundments as expected from the one hundred (100) year storm in relationship to permanent structures

13.04.440 General detention/retention basin design requirements.

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

- A. Duration of Storage. The maximum volume of water stored and subsequently released at the design release rate shall not result in a storage duration in excess of forty-eight (48) hours, unless additional storms occur within the period **Not provided** *See calculations*
- 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. *4.13' slightly exceeds 4' max-note it is close to requirement; once basin is expanded in the next phase this will not be an issue*
- C. Basin Distance From Dwellings. All stormwater detention facilities shall be separated by not less than fifty (50) feet from any building or structure to be occupied by humans. **Unless a Variance is requested, no building may be built within 50' of the lake** *Requesting variance.*
- 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. **Existing Basin**
- 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 measurements to one vertical unit of measurement (2:1) at any point in the side slope. **Existing Basin**
- 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 **Existing Basin**
- 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 measurements from a point two vertical feet below permanent pool, thence downward. **Existing Basin**
- H. Minimum Depth of Riprap Application. Riprap side slope armor shall be a minimum twelve (12) inches in depth at all points of application. **Existing Basin**

I. Drain Recommended for Maintenance of Wet Basins. If possible, a drain should be installed to lower the pool of wet basins to a level sufficient to repair any wave action erosion along the waterline, and to perform other periodic maintenance. **Not provided nor is it required**

J. 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 board. **Existing Basin**

K. 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. **No controls**

L. 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. **Existing Basin-provided**

M. 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. **Existing Basin**

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. **Existing Basin**

N. 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. **Existing Basin**

O. All Permanent Pools Require Water Quality Provisions. Designers of basins with permanent pools shall consult available manuals from the soil and water conservation district, and incorporate provisions therefrom for maintaining water quality, safety, and soil stability. **Existing Basin**

P. Dry Basin Cover and Maintenance. Dry basins shall be planted and maintained in vegetative cover equal to that of residential lawns **Wet Basin, not applicable**

Q. 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. **Existing Basin**

R. 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 **Existing Basin**

S. 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. **There appears to be sufficient space to maintain.**

T. 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. **Provided**

U. Maintenance Report Required for Basin.

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; **Not Provided- was this included with Section 1; if not one needs to be provided for remaining lots attached to the basin in this and future phases** *Lake maintenance easement was dedicated on the Section 1 plat.*

2. The report shall be attached to the restrictions for the property on which the basin and its parts are located.

3. Such restrictions shall be shown to exist prior to the board's final approval of the drainage plan for a project whose plans include a basin. **The drainage plan is being prior to final plat. See note under 13.04.460.**

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

W. Elevation of Dry Basin Bottom Marked. A continuous concrete liner at least equal in characteristics to that described in Section 13.04.315F shall be installed in all dry basins from the point of inflow of each channel entering a basin to the point of outflow from the basin. The concrete liner shall be installed at an elevation slightly lower than the earthen floor of the basin, so that it may serve as a trickle trough or low flow liner. **Wet Basin, not applicable**

Note: the existing basin was not constructed according to the original drainage plans. It appears that a large amount of silt has accumulated in the basin, and the side slopes do not appear to meet the drainage ordinance requirements. Also, no as-built plans have been submitted for the basin. Due to these deficiencies, there is an existing letter of credit to cover improvements to the basin. So while there are no changes planned or required as a result of section 4 phase 1 of Cayman Ridge, the basin will have to be constructed in accordance with the approved drainage plans (either the original plans or new plans that will be submitted with additional phases of section 4 of this sub) when the next phase of this subdivision is constructed.

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.

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.

The Drainage Plan needs to address whether a Plan A (Lot Owners) or Plan B (Repair Fund held by County) will be utilized. *Plan B - Repair Fund*

The Drainage Plan does not show the drainage easement that was previously platted on lots 321-323; will a request to vacate this easement be submitted and if so what is the timing for that submittal?

Drainage easement that extends out into Lots 321-323 will be vacated. We will file in a couple of weeks.



**CASH WAGGNER
& ASSOCIATES, PC**
CONSULTING ENGINEERS • LAND SURVEYORS

DATE: 02.26.15

ATTENTION: Jeff Mueller

PROJECT NO.: 14-1948

COMPANY: Vanderburgh County Surveyor

REFERENCE: Cayman Ridge - Section 4, Phase 1

ADDRESS: Civic Center Complex - Room 325

YOUR FILE NO.:

CITY, ST, ZIP: Evansville, IN 47708

PHONE:

THE FOLLOWING ITEMS:

COPIES:	ORIG./LAST REV. DATE:	DESCRIPTION:
1	02.26.15	Revised Drainage Plan & Report

LETTER OF TRANSMITTAL

ARE TRANSMITTED:

- PER YOUR REQUEST
- FOR YOUR FILES
- FOR REVIEW & COMMENT
- OTHER

FOR YOUR:

- APPROVAL
- USE
- INFORMATION
- OTHER

APPROVED

MAR 03 2015

VANDERBURGH COUNTY DRAINAGE BOARD

VIA:

- COURIER
- FOR PICK UP
- USPS
- NEXT DAY
- FED EX
- UPS
- DHL
- SATURDAY DELIVERY
- TRACKING # _____
- OTHER DELIVERED

COMMENTS:

Please review the attached drainage plan and report and if acceptable take to the March 3rd Drainage Board meeting for Final Drainage Plan approval. If you have any questions or comments, please give me a call. Thank you

414 CITADEL CIRCLE
SUITE B
EVANSVILLE, IN 47715
PH: 812.401.5561
FAX: 812.401.5563
GMRITT@CASHWAGGNER.COM

FROM:

GLEN MERITT, JR., P.E.

cc: File

**RECEIVED BY THE
VANDERBURGH COUNTY
SURVEYOR'S OFFICE**

2/27/15 AD



CASH WAGGNER
& ASSOCIATES, PC
CONSULTING ENGINEERS • LAND SURVEYORS

February 26, 2015

Mr. Jeff Mueller
Vanderburgh County Surveyor
Room 325 Civic Center - 1 NW Martin Luther King Jr. Blvd.
Evansville, IN 47708

**RE: Final Drainage Report
Cayman Ridge – Section 4, Phase 1
Kansas Road
Our Project #: 14-1948**



Mr. Mueller:

Below is a summary of the drainage calculations for the above-referenced project.

SITE DESCRIPTION

This development consists of a single family residential subdivision with 25 lots and its associated improvements (i.e. roads, utilities). The site is located on a 7.23-acre parcel that lies approximately 2000 feet west and 1050 feet north of the Highway 57 and Kansas Road intersection. This project will be constructed in one phase and the entire property will be disturbed during construction of the subdivision with the exception of the existing ditch that is located on the north side of Lot 314 and 315. This existing ditch will not be relocated until the Army Corp and IDEM permits have been approved. As a result, swale #3B will temporarily terminate in the west bank of the existing ditch on the north side of Lot 313. Once ditch relocation is complete, the existing ditch will be filled in and swale #3B will be excavated east to the detention basin as shown on Sheet C-101.

DRAINAGE PATTERNS

The existing 7.23-acre site (UN-1) was previously utilized as a cultivated field. The entire site drains in a northeasterly direction and runoff sheet flows to an existing ditch located on the northern end of the site. This ditch flows east to the existing detention basin located along the east property line, continues across Stonecreek PUD subdivision before ultimately discharging to Firlick Creek.

The 25 and 100-year flows were calculated for the six developed sub-basins within the 7.23-acre development. See the attached Developed Sub-basins Exhibit. The remaining 30.85-acres of undeveloped property (UN-2) and the existing developed portions of the subdivision which also drain to the existing detention basin have been included in the detention basin calculations to determine the storage volume required. Undeveloped Sub-basin #3 (UN-3) currently drains off-site undetained and the existing runoff from this sub-basin is not captured by the existing detention basin. See the attached Undeveloped Sub-basin Exhibit for the locations of each undeveloped sub-basin.

The 25 and 100-year flows were also calculated for this additional acreage that is currently being captured by the existing detention basin. There is one off-site sub-basin (Offsite Subbasin A) west of our site that drains to the existing ditch which is also being captured by the existing detention basin. See attached Offsite and Undeveloped Drainage Subbasins Exhibit for the location of Offsite Subbasin A.

A drainage swale and storm sewer network will be installed within the development to capture all of the storm water runoff and convey it to the existing detention basin located along the east property line. The primary and emergency spillway of the detention basin will discharge to the existing ditch located at the southeast corner of the detention basin.

CALCULATIONS

The Rational Method and HERPICC Manual were utilized in performing the drainage calculations for this project. All storm sewers and swales will be designed to carry the 25-year developed runoff. The attached calculations show that the existing detention basin will contain the peak 25-year developed runoff from the site while allowing a release rate less than the peak 10-year undeveloped runoff rate from the site. Therefore the existing detention basin will be left as is and will not be expanded until the Army Corp and IDEM permits for relocating the existing ditch have been issued. The emergency spillway for the detention basin was designed to carry the 100-year storm flow.

Below is a summary of the detention basin design elements:

		NOTES
Existing Detention Basin Developed Q(25)	138.35 - cfs	
Existing Detention Basin Developed Q(100)	158.78 - cfs	
Existing Detention Basin Undeveloped Q(10)	190.75 - cfs	Undeveloped Onsite Subbasin A
10/25-yr. Req'd Volume	294,612 c.f.	
Undetained Developed Q(25)	0.00 - cfs	
Off-Site Existing Q(25)	200.80 - cfs	Offsite Subbasin A
<i>Existing Detention Basin Release Rate</i>	<i>124.00 - cfs</i>	<i>Detention Basin #1 Primary Spillway</i>
<i>Outfall Structure</i>	<i>40-LF Existing 8' x 4' Concrete Box Culvert</i>	
Outfall I.E.	391.61	
25-year Storage Vol. Elev.	395.74	
HW (25-yr. elev. - I.E.)	4.13 - ft.	
Minimum Top/Bank	396.75	

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CASH WAGNER & ASSOCIATES, PC

414 CITADEL CIRCLE, STE. B
EVANSVILLE, IN 47715

PH: 812.401.5561
FAX: 812.401.5563

Open Channel Flow Calculations

Swale #: **1A**

Side slope = 3
 Bottom width = 1
 Manning's coefficient = 0.035
 Slope of channel = 0.0232

Depth (ft)	Wetted Perimeter (ft)	Area (ft ²)	Hydraulic Radius (ft)	Hydraulic Depth (ft)	Flowrate (cfs)	Velocity (ft/s)	F value
0.0	1.00	0.00	0.00	0.00	0.00	#DIV/0!	1.0
0.1	1.63	0.13	0.08	0.08	0.16	1.20	1.1
0.2	2.26	0.32	0.14	0.15	0.56	1.78	1.2
0.3	2.90	0.57	0.20	0.20	1.25	2.19	1.3
0.4	3.53	0.88	0.25	0.26	2.26	2.57	1.4
0.5	4.16	1.25	0.30	0.31	3.63	2.91	1.5
0.55	4.48	1.46	0.33	0.34	4.47	3.07	1.6
0.7	5.11	1.92	0.38	0.39	6.47	3.37	1.7
0.8	5.74	2.44	0.42	0.44	8.93	3.66	1.8
0.9	6.38	3.02	0.47	0.49	11.88	3.94	1.9
1.0	7.01	3.66	0.52	0.55	15.37	4.20	2.0

Open Channel Flow Calculations

Swale #: **1B**

Side slope = 3
 Bottom width = 1
 Manning's coefficient = 0.035
 Slope of channel = 0.0133

Depth (ft)	Wetted Perimeter (ft)	Area (ft ²)	Hydraulic Radius (ft)	Hydraulic Depth (ft)	Flowrate (cfs)	Velocity (ft/s)	F value
0.0	1.00	0.00	0.00	0.00	0.00	#DIV/0!	1.0
0.1	1.63	0.13	0.08	0.08	0.12	0.91	1.1
0.2	2.26	0.32	0.14	0.15	0.43	1.33	1.2
0.3	2.90	0.57	0.20	0.20	0.95	1.68	1.3
0.4	3.53	0.88	0.25	0.26	1.71	1.94	1.4
0.5	4.16	1.25	0.30	0.31	2.75	2.20	1.5
0.55	4.48	1.46	0.33	0.34	3.39	2.32	1.6
0.7	5.11	1.92	0.38	0.39	4.90	2.55	1.7
0.8	5.74	2.44	0.42	0.44	6.76	2.77	1.8
0.9	6.38	3.02	0.47	0.49	9.00	2.98	1.9
1.0	7.01	3.66	0.52	0.55	11.64	3.18	2.0

Open Channel Flow Calculations

Swale #: 2

Side slope = 3
 Bottom width = 1
 Manning's coefficient = 0.035
 Slope of channel = 0.0584

Depth (ft)	Wetted Perimeter (ft)	Area (ft ²)	Hydraulic Radius (ft)	Hydraulic Depth (ft)	Flowrate (cfs)	Velocity (ft/s)	F value
0.0	1.00	0.00	0.00	0.00	0.00	#DIV/0!	1.0
0.1	1.63	0.13	0.08	0.08	0.24	1.87	1.1
0.2	2.26	0.32	0.14	0.15	0.88	2.74	1.2
0.3	2.90	0.57	0.20	0.20	1.95	3.42	1.3
0.32	3.02	0.63	0.21	0.21	2.22	3.54	1.4
0.4	3.53	0.88	0.25	0.26	3.52	4.00	1.4
0.5	4.16	1.25	0.30	0.31	5.87	4.53	1.5
0.6	4.79	1.68	0.35	0.37	8.44	5.02	1.6
0.7	5.43	2.17	0.40	0.42	11.91	5.49	1.7
0.8	6.06	2.72	0.45	0.47	16.12	5.93	1.8
0.9	6.69	3.33	0.50	0.52	21.14	6.35	1.9
1.0	7.32	4.00	0.55	0.57	27.02	6.75	2.0

Open Channel Flow Calculations

Swale #: 3

Side slope = 3
 Bottom width = 1
 Manning's coefficient = 0.035
 Slope of channel = 0.0399

Depth (ft)	Wetted Perimeter (ft)	Area (ft ²)	Hydraulic Radius (ft)	Hydraulic Depth (ft)	Flowrate (cfs)	Velocity (ft/s)	F value
0.0	1.00	0.00	0.00	0.00	0.00	#DIV/0!	1.0
0.1	1.63	0.13	0.08	0.08	0.20	1.87	1.1
0.2	2.26	0.32	0.14	0.15	0.74	2.31	1.2
0.3	2.90	0.57	0.20	0.20	1.64	2.88	1.3
0.32	3.02	0.63	0.21	0.21	1.87	2.98	1.4
0.4	3.53	0.88	0.25	0.26	2.98	3.37	1.4
0.5	4.16	1.25	0.30	0.31	4.77	3.81	1.5
0.6	4.79	1.68	0.35	0.37	7.10	4.23	1.6
0.7	5.43	2.17	0.40	0.42	10.02	4.82	1.7
0.8	6.06	2.72	0.45	0.47	13.56	4.99	1.8
0.9	6.69	3.33	0.50	0.52	17.78	5.34	1.9
1.0	7.32	4.00	0.55	0.57	22.73	5.88	2.0

Open Channel Flow Calculations

Swale #: 3A

Side slope = 3
 Bottom width = 1
 Manning's coefficient = 0.035
 Slope of channel = 0.0122

Depth (ft)	Wetted Perimeter (ft)	Area (ft ²)	Hydraulic Radius (ft)	Hydraulic Depth (ft)	Flowrate (cfs)	Velocity (ft/s)	F value
0.0	1.00	0.00	0.00	0.00	0.00	#DIV/0!	1.0
0.1	1.63	0.13	0.08	0.08	0.11	0.87	1.1
0.2	2.26	0.32	0.14	0.15	0.41	1.28	1.2
0.3	2.90	0.57	0.20	0.20	0.91	1.59	1.3
0.32	3.02	0.63	0.21	0.21	1.03	1.85	1.4
0.4	3.53	0.88	0.25	0.26	1.64	1.88	1.4
0.5	4.16	1.25	0.30	0.31	2.84	2.11	1.5
0.6	4.79	1.68	0.35	0.37	3.93	2.34	1.6
0.7	5.43	2.17	0.40	0.42	5.54	2.56	1.7
0.8	6.06	2.72	0.45	0.47	7.50	2.78	1.8
0.9	6.69	3.33	0.50	0.52	9.83	2.95	1.9
1.0	7.32	4.00	0.55	0.57	12.57	3.14	2.0

Open Channel Flow Calculations

Swale #: **3B**

Side slope = 3
 Bottom width = 1
 Manning's coefficient = 0.035
 Slope of channel = 0.0145

Depth (ft)	Wetted Perimeter (ft)	Area (ft ²)	Hydraulic Radius (ft)	Hydraulic Depth (ft)	Flowrate (cfs)	Velocity (ft/s)	F value
0.0	1.00	0.00	0.00	0.00	0.00	#DIV/0!	1.0
0.1	1.63	0.13	0.08	0.08	0.12	0.95	1.1
0.2	2.26	0.32	0.14	0.15	0.44	1.39	1.2
0.3	2.90	0.57	0.20	0.20	0.99	1.73	1.3
0.32	3.02	0.63	0.21	0.21	1.13	1.80	1.4
0.4	3.53	0.88	0.25	0.26	1.79	2.03	1.4
0.5	4.16	1.25	0.30	0.31	2.87	2.30	1.5
0.6	4.79	1.68	0.35	0.37	4.28	2.55	1.6
0.7	5.43	2.17	0.40	0.42	6.04	2.78	1.7
0.8	6.06	2.72	0.45	0.47	8.17	3.01	1.8
0.9	6.69	3.33	0.50	0.52	10.72	3.22	1.9
1.0	7.32	4.00	0.55	0.57	13.70	3.42	2.0

Open Channel Flow Calculations

Swale #: 4

Side slope = 3
 Bottom width = 1
 Manning's coefficient = 0.035
 Slope of channel = 0.0085

Depth (ft)	Wetted Perimeter (ft)	Area (ft ²)	Hydraulic Radius (ft)	Hydraulic Depth (ft)	Flowrate (cfs)	Velocity (ft/s)	F value
0.0	1.00	0.00	0.00	0.00	0.00	#DIV/0!	1.0
0.1	1.63	0.13	0.08	0.08	0.09	0.73	1.1
0.2	2.26	0.32	0.14	0.15	0.34	1.06	1.2
0.3	2.90	0.57	0.20	0.20	0.76	1.33	1.3
0.32	3.02	0.63	0.21	0.21	0.86	1.38	1.4
0.4	3.53	0.88	0.25	0.26	1.37	1.55	1.4
0.5	4.16	1.25	0.30	0.31	2.20	1.76	1.5
0.6	4.54	1.50	0.33	0.34	2.82	1.88	1.6
0.7	5.17	1.97	0.38	0.40	4.05	2.08	1.7
0.8	5.81	2.49	0.43	0.45	5.57	2.23	1.8
0.9	6.44	3.08	0.48	0.50	7.39	2.40	1.9
1.0	7.07	3.72	0.53	0.55	9.54	2.56	2.0

Open Channel Flow Calculations

Swale #: **5**

Side slope = 3
 Bottom width = 1
 Manning's coefficient = 0.035
 Slope of channel = 0.0239

Depth (ft)	Wetted Perimeter (ft)	Area (ft ²)	Hydraulic Radius (ft)	Hydraulic Depth (ft)	Flowrate (cfs)	Velocity (ft/s)	F value
0.0	1.00	0.00	0.00	0.00	0.00	#DIV/0!	1.0
0.1	1.63	0.13	0.08	0.08	0.16	1.22	1.1
0.2	2.26	0.32	0.14	0.15	0.57	1.79	1.2
0.3	2.90	0.57	0.20	0.20	1.27	2.23	1.3
0.32	3.02	0.63	0.21	0.21	1.45	2.31	1.4
0.4	3.53	0.88	0.25	0.26	2.29	2.61	1.4
0.5	4.16	1.25	0.30	0.31	3.69	2.95	1.5
0.6	4.79	1.68	0.35	0.37	5.50	3.27	1.6
0.7	5.43	2.17	0.40	0.42	7.75	3.57	1.7
0.8	6.06	2.72	0.45	0.47	10.49	3.86	1.8
0.9	6.69	3.33	0.50	0.52	13.76	4.13	1.9
1.0	7.32	4.00	0.55	0.57	17.59	4.40	2.0

Open Channel Flow Calculations

Swale #: **5A**

Side slope = 3
 Bottom width = 1
 Manning's coefficient = 0.035
 Slope of channel = 0.0188

Depth (ft)	Wetted Perimeter (ft)	Area (ft ²)	Hydraulic Radius (ft)	Hydraulic Depth (ft)	Flowrate (cfs)	Velocity (ft/s)	F value
0.0	1.00	0.00	0.00	0.00	0.00	#DIV/0!	1.0
0.1	1.63	0.13	0.08	0.08	0.14	1.07	1.1
0.2	2.26	0.32	0.14	0.15	0.50	1.57	1.2
0.3	2.90	0.57	0.20	0.20	1.12	1.96	1.3
0.32	3.02	0.63	0.21	0.21	1.28	2.03	1.4
0.4	3.53	0.88	0.25	0.26	2.02	2.30	1.4
0.5	4.16	1.25	0.30	0.31	3.25	2.90	1.5
0.6	4.79	1.68	0.35	0.37	4.85	2.89	1.6
0.7	5.43	2.17	0.40	0.42	6.84	3.15	1.7
0.8	6.06	2.72	0.45	0.47	9.26	3.40	1.8
0.9	6.69	3.33	0.50	0.52	12.14	3.65	1.9
1.0	7.32	4.00	0.55	0.57	15.52	3.88	2.0

Open Channel Flow Calculations

Swale #:

6

Side slope = 3
 Bottom width = 1
 Manning's coefficient = 0.035
 Slope of channel = 0.0287

Depth (ft)	Wetted Perimeter (ft)	Area (ft ²)	Hydraulic Radius (ft)	Hydraulic Depth (ft)	Flowrate (cfs)	Velocity (ft/s)	F value
0.0	1.00	0.00	0.00	0.00	0.00	#DIV/0!	1.0
0.1	1.63	0.13	0.08	0.08	0.18	1.38	1.1
0.2	2.26	0.32	0.14	0.15	0.84	1.99	1.2
0.3	2.90	0.57	0.20	0.20	1.41	2.48	1.3
0.32	3.02	0.63	0.21	0.21	1.61	2.57	1.4
0.4	3.53	0.88	0.25	0.26	2.56	2.91	1.4
0.5	4.16	1.25	0.30	0.31	4.11	3.29	1.5
0.6	4.79	1.68	0.35	0.37	8.13	3.65	1.6
0.7	5.43	2.17	0.40	0.42	8.84	3.98	1.7
0.8	6.06	2.72	0.45	0.47	11.70	4.30	1.8
0.9	6.69	3.33	0.50	0.52	15.34	4.61	1.9
1.0	7.32	4.00	0.55	0.57	19.61	4.90	2.0