# DRAINAGE ENGINEERING REPORT

# FOR

# AUSTIN OAKS PUD

## AUSTIN, TEXAS

**JULY 6, 2016**


**PREPARED BY:**

**URBAN DESIGN GROUP P C**

**STATE OF TEXAS FIRM REG. NO. F-1843**

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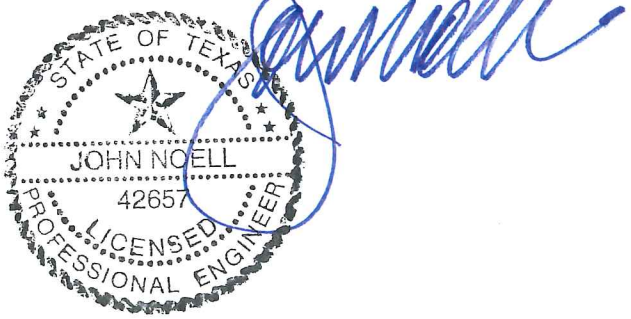

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## 1. EXECUTIVE SUMMARY

Urban Design Group (UDG) has prepared this Preliminary Drainage Engineering Report for the proposed Austin Oaks Planned Unit Development (PUD) to assess the impact of the proposed reduction in impervious cover and addition of storm water detention in two existing paved parking areas which are programmed for removal. The proposed development is located on a 31.4 acre tract (Site), located on the southwest corner of the intersection of Spicewood Springs Road and Mopac Expressway. The Site is located in the City of Austin (COA), in Travis County, Texas. The Site is in the Shoal Creek watershed.

The report details the UDG drainage analysis of the Site. The analysis includes review of the existing hydrology, and impacts of the construction of the proposed development. Based on the drainage analysis, the proposed development will reduce site discharge flows below current 2016 conditions.

## 2. HYDROLOGY

The Site consist of soils of hydrologic soil group C which is composed of Volente soils with 1% to 8% slopes, and hydrologic soil group D which is composed of Tarrant soils, 0% to 18% slopes.

The existing development on the Site is approximately 66% impervious cover, composed of office buildings and associated parking. Currently there is no storm water detention for the Site. There are other nearby regional detention facilities and some detention resulting from the backwater effects of undersized culverts. These facilities are documented in the city's current hydrologic and hydraulic models for the watershed.

The proposed development will increase the open space with park and greenbelt areas and therefore decrease the impervious cover. The proposed impervious cover in the PUD will result from mixed use development including office, multi-family, restaurant and hotel, all with associated parking. The proposed development will also include water quality ponds throughout the Site. The proposed development will result in a decrease of impervious cover down to approximately 58%.

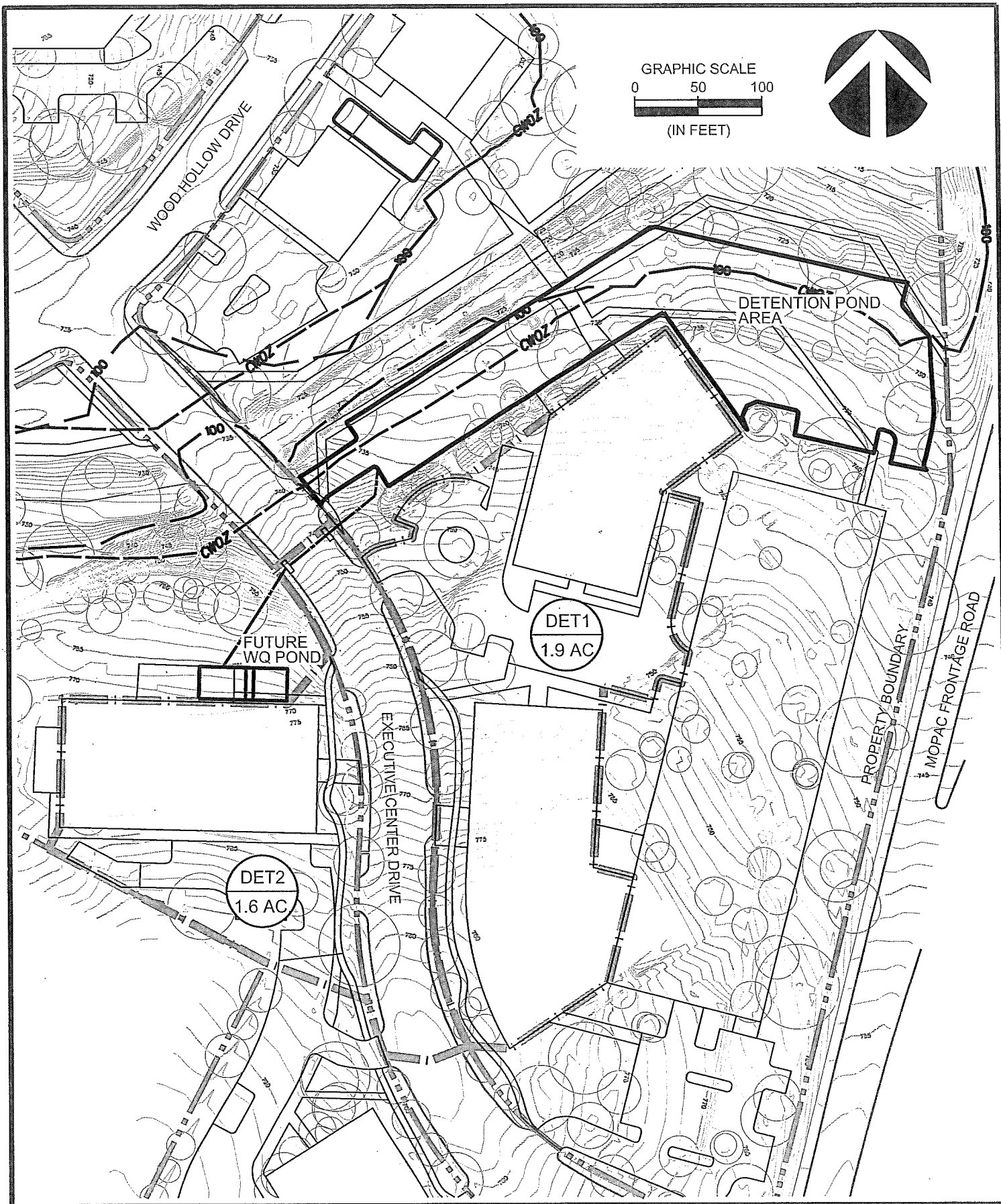
UDG created a hypothetical hydrologic model using Hydrologic Engineering Center – Hydrologic Modeling System (HEC-HMS) v4.1 for the Site. The model was used to analyze existing and proposed conditions, based on the hydrologic information discussed above.

## 3. FLOW RATE SUMMARY

Without any added stormwater detention, the proposed development would decrease the flow rates leaving the Site due to a proposed lower impervious cover. Although detention is not required for the re-development, it has been suggested that detention be added to areas where parking areas will be demolished and re-vegetated on the high bank of the creek. Early estimates of the volume of detention which could result from these areas was 20,000 $ft^3$. A summarized table about the effects of the decreased impervious cover and added detention are included in the appendices of this report.

The flows, CN numbers, detention calculations, and a detention location map are included in the appendices of this report.

# PRELIMINARY SKETCH FOR DETENTION POND AREA

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BY: MM
UDG JOB NO.: 15-864

# AUSTIN OAKS

## PRELIMINARY SKETCH FOR DETENTION POND AREA

\\server\data\Data Drive\Projects\Austin Oaks 15-864\CAD\(Plans) PUD\SHEETS\AO-s-PRELIM DETENTION LOCATION.dgn
7/6/2016

# HYDROLOGIC COMPUTATIONS AND OUTPUT

| Reduction in Peak Flow Rate Due to Lower Impervious Cover Only | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Existing | | | | | Proposed | | | | | Pro-Ex. | | | |
| Basin | $CN_{weighted}$ | $Q^2$ | $Q^{10}$ | $Q^{25}$ | $Q^{100}$ | $CN_{weighted}$ | $Q^2$ | $Q^{10}$ | $Q^{25}$ | $Q^{100}$ | $Q^2$ | $Q^{10}$ | $Q^{25}$ | $Q^{100}$ |
| - | - | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | - | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ |
| AO1 | 94 | 25.6 | 46.1 | 55.9 | 71.3 | 91 | 21.9 | 42.1 | 51.7 | 66.9 | -3.7 | -4.0 | -4.2 | -4.4 |
| AO2 | 92 | 32.2 | 60.1 | 73.3 | 93.9 | 91 | 29.5 | 56.2 | 69.0 | 89.1 | -2.7 | -3.9 | -4.3 | -4.8 |
| AO3 | 90 | 14.2 | 27.5 | 33.8 | 43.6 | 82 | 8.4 | 19.9 | 25.5 | 34.1 | -5.8 | -7.6 | -8.3 | -9.5 |
| AO4 | 91 | 24.5 | 46.7 | 57.3 | 73.7 | 92 | 22.6 | 42.5 | 52.1 | 67.4 | -1.9 | -4.2 | -5.2 | -6.3 |
| AO5 | 92 | 7.6 | 14.1 | 17.2 | 22.0 | 88 | 8.0 | 16.5 | 20.5 | 26.9 | 0.4 | 2.4 | 3.3 | 4.9 |
| AO6 | 93 | 19.0 | 34.6 | 42.0 | 53.6 | 94 | 19.4 | 34.9 | 42.3 | 53.8 | 0.4 | 0.3 | 0.3 | 0.2 |
| AO7 | 77 | 3.6 | 9.8 | 13.0 | 18.0 | 77 | 3.6 | 9.8 | 13.0 | 18.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | | 126.7 | 238.9 | 292.5 | 376.1 | - | 113.4 | 221.9 | 274.1 | 356.2 | -13.3 | -17.0 | -18.4 | -19.9 |

| Reduction in Peak Flow Rate Due to Lower Impervious Cover and Detention | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Existing | | | | | Proposed | | | | | Pro-Ex. | | | |
| Basin | $CN_{weighted}$ | $Q^2$ | $Q^{10}$ | $Q^{25}$ | $Q^{100}$ | $CN_{weighted}$ | $Q^2$ | $Q^{10}$ | $Q^{25}$ | $Q^{100}$ | $Q^2$ | $Q^{10}$ | $Q^{25}$ | $Q^{100}$ |
| - | - | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | - | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ |
| AO1 | 94 | 25.6 | 46.1 | 55.9 | 71.3 | 91 | 21.9 | 42.1 | 51.7 | 66.9 | -3.7 | -4.0 | -4.2 | -4.4 |
| AO2 | 92 | 32.2 | 60.1 | 73.3 | 93.9 | 91 | 29.5 | 56.2 | 69.0 | 89.1 | -2.7 | -3.9 | -4.3 | -4.8 |
| AO3 | 90 | 14.2 | 27.5 | 33.8 | 43.6 | 82 | 8.4 | 19.9 | 25.5 | 34.1 | -5.8 | -7.6 | -8.3 | -9.5 |
| AO4 | 91 | 24.5 | 46.7 | 57.3 | 73.7 | 92 | 16.3 | 32.3 | 42.8 | 59.9 | -8.2 | -14.4 | -14.5 | -13.8 |
| AO5 | 92 | 7.6 | 14.1 | 17.2 | 22.0 | 88 | 2.5 | 5.8 | 8.8 | 15.0 | -5.1 | -8.3 | -8.4 | -7.0 |
| AO6 | 93 | 19.0 | 34.6 | 42.0 | 53.6 | 94 | 19.4 | 34.9 | 42.3 | 53.8 | 0.4 | 0.3 | 0.3 | 0.2 |
| AO7 | 77 | 3.6 | 9.8 | 13.0 | 18.0 | 77 | 3.6 | 9.8 | 13.0 | 18.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | | 126.7 | 238.9 | 292.5 | 376.1 | - | 101.6 | 201.0 | 253.1 | 336.8 | -25.1 | -37.9 | -39.4 | -39.3 |

| Existing Austin Oaks | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Basin | Area | $CN_{weighted}$ | Impervious | ToC | $Q^{2}$ | $Q^{10}$ | $Q^{25}$ | $Q^{100}$ |
| - | ac. | - | % | min. | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ |
| AO1 | 6.1 | 94 | 77 | 5 | 25.6 | 46.1 | 55.9 | 71.3 |
| AO2 | 8.1 | 92 | 68 | 5 | 32.2 | 60.1 | 73.3 | 93.9 |
| AO3 | 3.8 | 90 | 68 | 5 | 14.2 | 27.5 | 33.8 | 43.6 |
| AO4 | 6.4 | 91 | 64 | 5 | 24.5 | 46.7 | 57.3 | 73.7 |
| AO5 | 1.9 | 92 | 68 | 5 | 7.6 | 14.1 | 17.2 | 22.0 |
| AO6 | 4.6 | 93 | 74 | 5 | 19.0 | 34.6 | 42.0 | 53.6 |
| AO7 | 1.8 | 77 | 0 | 5 | 3.6 | 9.8 | 13.0 | 18.0 |

| Proposed Austin Oaks | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Basin | Area | $CN_{weighted}$ | Impervious | ToC | $Q^{2}$ | $Q^{10}$ | $Q^{25}$ | $Q^{100}$ |
| - | ac. | - | % | min. | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ | $ft^3/s$ |
| AO1 | 6.1 | 91 | 61 | 7 | 21.9 | 42.1 | 51.7 | 66.9 |
| AO2 | 8.1 | 91 | 63 | 6 | 29.5 | 56.2 | 69.0 | 89.1 |
| AO3 | 3.2 | 82 | 34 | 5 | 8.4 | 19.9 | 25.5 | 34.1 |
| AO4a | 0.9 | 92 | 67 | 5 | 3.5 | 6.6 | 8.1 | 10.4 |
| AO4b | 1.0 | 96 | 90 | 5 | 4.6 | 7.9 | 9.5 | 12.1 |
| AO4c | 4.5 | 91 | 64 | 9 | 15.3 | 29.4 | 36.1 | 46.9 |
| AO5a | 1.6 | 92 | 69 | 5 | 6.4 | 11.9 | 14.5 | 18.6 |
| AO5b | 0.9 | 80 | 0 | 6 | 2.0 | 5.0 | 6.5 | 8.9 |
| AO6 | 4.6 | 94 | 78 | 5 | 19.4 | 34.9 | 42.3 | 53.8 |
| AO7 | 1.8 | 77 | 0 | 5 | 3.6 | 9.8 | 13.0 | 18.0 |
| * Basins AO4a and AO4b drain to Detention 1. Basin AO5a drains to Detention 2. | | | | | | | | |

Austin Oaks - PUD (UDG 15-864)
Detention Volume

| Typical Detention 1 (4a,4b) Summary | | | | | |
|---|---|---|---|---|---|
| Elevation | Area | Area | Volume | Cum. Vol. | Cum. Vol. |
| ft. | $ft^2$ | ac-ft. | $ft^3$ | $ft^3$ | ac-ft. |
| 726 | 5000 | 0.115 | 0 | 0 | 0 |
| 727 | 5000 | 0.115 | 5000 | 5000 | 0.115 |
| 728 | 5000 | 0.115 | 5000 | 10000 | 0.230 |
| 729 | 5000 | 0.115 | 5000 | 15000 | 0.344 |
| 730 | 5000 | 0.115 | 5000 | 20000 | 0.459 |

| Typical Detention 1 | | | | |
|---|---|---|---|---|
| Stage-Storage-Discharge | | | | |
| Storm | $Q^{pond\ in}$ | $Q^{pond\ out}$ | WSEL | Storage |
| - | $ft^3/s$ | $ft^3/s$ | ft. | ac-ft. |
| 2YR | 8.1 | 1.1 | 727.7 | 0.19 |
| 10YR | 14.5 | 5.3 | 728.8 | 0.32 |
| 25YR | 17.6 | 8.6 | 729.1 | 0.36 |
| 100YR | 22.4 | 14.4 | 729.7 | 0.42 |

| Outlet | Ele. (ft.) | Dia./Length (ft.) |
|---|---|---|
| Orifice 1 | 726.0 | 0.5 |
| Spillway 1 | 728.0 | 2.0 |

| Typical Detention 2 (5a) Summary | | | | | |
|---|---|---|---|---|---|
| Elevation | Area | Area | Volume | Cum. Vol. | Cum. Vol. |
| ft. | $ft^2$ | ac-ft. | $ft^3$ | $ft^3$ | ac-ft. |
| 730 | 5000 | 0.115 | 0 | 0 | 0 |
| 731 | 5000 | 0.115 | 5000 | 5000 | 0.115 |
| 732 | 5000 | 0.115 | 5000 | 10000 | 0.230 |
| 733 | 5000 | 0.115 | 5000 | 15000 | 0.344 |
| 734 | 5000 | 0.115 | 5000 | 20000 | 0.459 |

| Typical Detention 2 | | | | |
|---|---|---|---|---|
| Stage-Storage-Discharge | | | | |
| Storm | $Q^{pond\ in}$ | $Q^{pond\ out}$ | WSEL | Storage |
| - | $ft^3/s$ | $ft^3/s$ | ft. | ac-ft. |
| 2YR | 6.4 | 0.7 | 731.4 | 0.16 |
| 10YR | 11.9 | 2.5 | 732.6 | 0.3 |
| 25YR | 14.5 | 4.4 | 733.1 | 0.35 |
| 100YR | 18.6 | 8.1 | 733.8 | 0.43 |

| Outlet | Ele. (ft.) | Dia./Length (ft.) |
|---|---|---|
| Orifice 1 | 730.0 | 0.42 |
| Spillway 1 | 732.0 | 1.00 |

# HEC-HMS
# MODEL

Project: AO PUD Simulation Run: 2YR

Start of Run: 01Oct2008, 00:00 Basin Model: Ex & Pr
End of Run: 02Oct2008, 00:00 Meteorologic Model: 2YR
Compute Time: 07Jul2016, 10:55:09 Control Specifications: 24HR

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| EX AO1 | 0.00953 | 25.6 | 01Oct2008, 12:04 | 2.37 |
| EX AO2 | 0.01266 | 32.2 | 01Oct2008, 12:04 | 2.20 |
| EX AO3 | 0.00594 | 14.2 | 01Oct2008, 12:04 | 2.04 |
| EX AO4 | 0.01000 | 24.5 | 01Oct2008, 12:04 | 2.10 |
| EX AO5 | 0.00297 | 7.6 | 01Oct2008, 12:04 | 2.21 |
| EX AO6 | 0.00719 | 19.0 | 01Oct2008, 12:04 | 2.31 |
| EX AO7 | 0.00281 | 3.6 | 01Oct2008, 12:05 | 1.11 |
| PR AO1 | 0.00953 | 21.9 | 01Oct2008, 12:05 | 2.09 |
| PR AO2 | 0.01266 | 29.5 | 01Oct2008, 12:05 | 2.12 |
| PR AO3 | 0.00500 | 8.4 | 01Oct2008, 12:05 | 1.42 |
| PR AO4 | 0.01000 | 22.6 | 01Oct2008, 12:06 | 2.20 |
| PR AO5 | 0.00297 | 5.2 | 01Oct2008, 12:05 | 1.59 |
| PR AO6 | 0.00719 | 19.4 | 01Oct2008, 12:04 | 2.38 |
| PR AO7 | 0.00281 | 3.6 | 01Oct2008, 12:05 | 1.11 |

Project: AO PUD Simulation Run: 10YR

Start of Run: 01Oct2008, 00:00 Basin Model: Ex & Pr
End of Run: 02Oct2008, 00:00 Meteorologic Model: 10YR
Compute Time: 07Jul2016, 10:54:59 Control Specifications: 24HR

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| EX AO1 | 0.00953 | 46.1 | 01Oct2008, 12:04 | 5.32 |
| EX AO2 | 0.01266 | 60.1 | 01Oct2008, 12:04 | 5.12 |
| EX AO3 | 0.00594 | 27.5 | 01Oct2008, 12:04 | 4.92 |
| EX AO4 | 0.01000 | 46.7 | 01Oct2008, 12:04 | 5.00 |
| EX AO5 | 0.00297 | 14.1 | 01Oct2008, 12:04 | 5.14 |
| EX AO6 | 0.00719 | 34.6 | 01Oct2008, 12:04 | 5.25 |
| EX AO7 | 0.00281 | 9.8 | 01Oct2008, 12:04 | 3.54 |
| PR AO1 | 0.00953 | 42.1 | 01Oct2008, 12:05 | 4.98 |
| PR AO2 | 0.01266 | 56.2 | 01Oct2008, 12:05 | 5.02 |
| PR AO3 | 0.00500 | 19.9 | 01Oct2008, 12:04 | 4.05 |
| PR AO4 | 0.01000 | 42.5 | 01Oct2008, 12:06 | 5.12 |
| PR AO5 | 0.00297 | 11.8 | 01Oct2008, 12:05 | 4.30 |
| PR AO6 | 0.00719 | 34.9 | 01Oct2008, 12:04 | 5.34 |
| PR AO7 | 0.00281 | 9.8 | 01Oct2008, 12:04 | 3.54 |

Project: AO PUD Simulation Run: 25YR

Start of Run: 01Oct2008, 00:00 Basin Model: Ex & Pr
End of Run: 02Oct2008, 00:00 Meteorologic Model: 25YR
Compute Time: 07Jul2016, 10:55:14 Control Specifications: 24HR

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| EX AO1 | 0.00953 | 55.9 | 01Oct2008, 12:04 | 6.90 |
| EX AO2 | 0.01266 | 73.3 | 01Oct2008, 12:04 | 6.70 |
| EX AO3 | 0.00594 | 33.8 | 01Oct2008, 12:04 | 6.49 |
| EX AO4 | 0.01000 | 57.3 | 01Oct2008, 12:04 | 6.57 |
| EX AO5 | 0.00297 | 17.2 | 01Oct2008, 12:04 | 6.71 |
| EX AO6 | 0.00719 | 42.0 | 01Oct2008, 12:04 | 6.83 |
| EX AO7 | 0.00281 | 13.0 | 01Oct2008, 12:04 | 4.97 |
| PR AO1 | 0.00953 | 51.7 | 01Oct2008, 12:05 | 6.55 |
| PR AO2 | 0.01266 | 69.0 | 01Oct2008, 12:05 | 6.59 |
| PR AO3 | 0.00500 | 25.5 | 01Oct2008, 12:04 | 5.55 |
| PR AO4 | 0.01000 | 52.1 | 01Oct2008, 12:06 | 6.70 |
| PR AO5 | 0.00297 | 14.9 | 01Oct2008, 12:05 | 5.82 |
| PR AO6 | 0.00719 | 42.3 | 01Oct2008, 12:04 | 6.93 |
| PR AO7 | 0.00281 | 13.0 | 01Oct2008, 12:04 | 4.97 |

Project: AO PUD Simulation Run: 100YR

Start of Run: 01Oct2008, 00:00 Basin Model: Ex & Pr
End of Run: 02Oct2008, 00:00 Meteorologic Model: 100YR
Compute Time: 07Jul2016, 10:55:04 Control Specifications: 24HR

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| EX AO1 | 0.00953 | 71.3 | 01Oct2008, 12:04 | 9.45 |
| EX AO2 | 0.01266 | 93.9 | 01Oct2008, 12:04 | 9.24 |
| EX AO3 | 0.00594 | 43.6 | 01Oct2008, 12:04 | 9.02 |
| EX AO4 | 0.01000 | 73.7 | 01Oct2008, 12:04 | 9.10 |
| EX AO5 | 0.00297 | 22.0 | 01Oct2008, 12:04 | 9.25 |
| EX AO6 | 0.00719 | 53.6 | 01Oct2008, 12:04 | 9.38 |
| EX AO7 | 0.00281 | 18.0 | 01Oct2008, 12:04 | 7.35 |
| PR AO1 | 0.00953 | 66.9 | 01Oct2008, 12:05 | 9.08 |
| PR AO2 | 0.01266 | 89.1 | 01Oct2008, 12:05 | 9.13 |
| PR AO3 | 0.00500 | 34.1 | 01Oct2008, 12:04 | 8.00 |
| PR AO4 | 0.01000 | 67.4 | 01Oct2008, 12:06 | 9.23 |
| PR AO5 | 0.00297 | 19.8 | 01Oct2008, 12:05 | 8.30 |
| PR AO6 | 0.00719 | 53.8 | 01Oct2008, 12:04 | 9.47 |
| PR AO7 | 0.00281 | 18.0 | 01Oct2008, 12:04 | 7.35 |

Project: AO PUD Simulation Run: PR 2YR

Start of Run: 01Oct2008, 00:00 Basin Model: Ex & Pr Det
End of Run: 02Oct2008, 00:00 Meteorologic Model: 2YR
Compute Time: 06Jul2016, 13:24:30 Control Specifications: 24HR

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| EX AO1 | 0.00953 | 25.6 | 01Oct2008, 12:04 | 2.37 |
| EX AO2 | 0.01266 | 32.2 | 01Oct2008, 12:04 | 2.20 |
| EX AO3 | 0.00594 | 14.2 | 01Oct2008, 12:04 | 2.04 |
| EX AO4 | 0.01000 | 24.5 | 01Oct2008, 12:04 | 2.10 |
| EX AO5 | 0.00297 | 7.6 | 01Oct2008, 12:04 | 2.21 |
| EX AO6 | 0.00719 | 19.0 | 01Oct2008, 12:04 | 2.31 |
| EX AO7 | 0.00281 | 3.6 | 01Oct2008, 12:05 | 1.11 |
| PR AO1 | 0.00953 | 21.9 | 01Oct2008, 12:05 | 2.09 |
| PR AO2 | 0.01266 | 29.5 | 01Oct2008, 12:05 | 2.12 |
| PR AO3 | 0.00500 | 8.4 | 01Oct2008, 12:05 | 1.42 |
| PR AO4a | 0.00140 | 3.5 | 01Oct2008, 12:04 | 2.19 |
| PR AO4b | 0.00160 | 4.6 | 01Oct2008, 12:04 | 2.60 |
| Det 1 | 0.00300 | 1.1 | 01Oct2008, 12:29 | 2.40 |
| PR AO4c | 0.00700 | 15.3 | 01Oct2008, 12:06 | 2.12 |
| J_AO4 | 0.01000 | 16.3 | 01Oct2008, 12:06 | 2.21 |
| PR AO5a | 0.00250 | 6.4 | 01Oct2008, 12:04 | 2.22 |
| Det 2 | 0.00250 | 0.7 | 01Oct2008, 12:36 | 2.22 |
| PR AO5b | 0.00140 | 2.0 | 01Oct2008, 12:06 | 1.27 |
| J_AO5 | 0.00390 | 2.5 | 01Oct2008, 12:06 | 1.88 |
| PR AO6 | 0.00719 | 19.4 | 01Oct2008, 12:04 | 2.38 |
| PR AO7 | 0.00281 | 3.6 | 01Oct2008, 12:05 | 1.11 |

Project: AO PUD Simulation Run: PR 10YR

Start of Run: 01Oct2008, 00:00 Basin Model: Ex & Pr Det
End of Run: 02Oct2008, 00:00 Meteorologic Model: 10YR
Compute Time: 06Jul2016, 13:24:17 Control Specifications: 24HR

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| EX AO1 | 0.00953 | 46.1 | 01Oct2008, 12:04 | 5.32 |
| EX AO2 | 0.01266 | 60.1 | 01Oct2008, 12:04 | 5.12 |
| EX AO3 | 0.00594 | 27.5 | 01Oct2008, 12:04 | 4.92 |
| EX AO4 | 0.01000 | 46.7 | 01Oct2008, 12:04 | 5.00 |
| EX AO5 | 0.00297 | 14.1 | 01Oct2008, 12:04 | 5.14 |
| EX AO6 | 0.00719 | 34.6 | 01Oct2008, 12:04 | 5.25 |
| EX AO7 | 0.00281 | 9.8 | 01Oct2008, 12:04 | 3.54 |
| PR AO1 | 0.00953 | 42.1 | 01Oct2008, 12:05 | 4.98 |
| PR AO2 | 0.01266 | 56.2 | 01Oct2008, 12:05 | 5.02 |
| PR AO3 | 0.00500 | 19.9 | 01Oct2008, 12:04 | 4.05 |
| PR AO4a | 0.00140 | 6.6 | 01Oct2008, 12:04 | 5.10 |
| PR AO4b | 0.00160 | 7.9 | 01Oct2008, 12:04 | 5.58 |
| Det 1 | 0.00300 | 5.3 | 01Oct2008, 12:14 | 5.34 |
| PR AO4c | 0.00700 | 29.4 | 01Oct2008, 12:06 | 5.02 |
| J_AO4 | 0.01000 | 32.3 | 01Oct2008, 12:07 | 5.11 |
| PR AO5a | 0.00250 | 11.9 | 01Oct2008, 12:04 | 5.15 |
| Det 2 | 0.00250 | 2.5 | 01Oct2008, 12:21 | 5.10 |
| PR AO5b | 0.00140 | 5.0 | 01Oct2008, 12:05 | 3.81 |
| J_AO5 | 0.00390 | 5.8 | 01Oct2008, 12:06 | 4.64 |
| PR AO6 | 0.00719 | 34.9 | 01Oct2008, 12:04 | 5.34 |
| PR AO7 | 0.00281 | 9.8 | 01Oct2008, 12:04 | 3.54 |

Project: AO PUD Simulation Run: PR 25YR

Start of Run: 01Oct2008, 00:00 Basin Model: Ex & Pr Det
End of Run: 02Oct2008, 00:00 Meteorologic Model: 25YR
Compute Time: 06Jul2016, 13:24:36 Control Specifications: 24HR

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| EX AO1 | 0.00953 | 55.9 | 01Oct2008, 12:04 | 6.90 |
| EX AO2 | 0.01266 | 73.3 | 01Oct2008, 12:04 | 6.70 |
| EX AO3 | 0.00594 | 33.8 | 01Oct2008, 12:04 | 6.49 |
| EX AO4 | 0.01000 | 57.3 | 01Oct2008, 12:04 | 6.57 |
| EX AO5 | 0.00297 | 17.2 | 01Oct2008, 12:04 | 6.71 |
| EX AO6 | 0.00719 | 42.0 | 01Oct2008, 12:04 | 6.83 |
| EX AO7 | 0.00281 | 13.0 | 01Oct2008, 12:04 | 4.97 |
| PR AO1 | 0.00953 | 51.7 | 01Oct2008, 12:05 | 6.55 |
| PR AO2 | 0.01266 | 69.0 | 01Oct2008, 12:05 | 6.59 |
| PR AO3 | 0.00500 | 25.5 | 01Oct2008, 12:04 | 5.55 |
| PR AO4a | 0.00140 | 8.1 | 01Oct2008, 12:04 | 6.68 |
| PR AO4b | 0.00160 | 9.5 | 01Oct2008, 12:04 | 7.18 |
| Det 1 | 0.00300 | 8.6 | 01Oct2008, 12:11 | 6.90 |
| PR AO4c | 0.00700 | 36.1 | 01Oct2008, 12:06 | 6.59 |
| J_AO4 | 0.01000 | 42.8 | 01Oct2008, 12:07 | 6.68 |
| PR AO5a | 0.00250 | 14.5 | 01Oct2008, 12:04 | 6.73 |
| Det 2 | 0.00250 | 4.4 | 01Oct2008, 12:17 | 6.63 |
| PR AO5b | 0.00140 | 6.5 | 01Oct2008, 12:05 | 5.28 |
| J_AO5 | 0.00390 | 8.8 | 01Oct2008, 12:07 | 6.15 |
| PR AO6 | 0.00719 | 42.3 | 01Oct2008, 12:04 | 6.93 |
| PR AO7 | 0.00281 | 13.0 | 01Oct2008, 12:04 | 4.97 |

Project: AO PUD Simulation Run: PR 100YR

Start of Run: 01Oct2008, 00:00 Basin Model: Ex & Pr Det
End of Run: 02Oct2008, 00:00 Meteorologic Model: 100YR
Compute Time: 06Jul2016, 13:24:24 Control Specifications: 24HR

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (IN) |
|---|---|---|---|---|
| EX AO1 | 0.00953 | 71.3 | 01Oct2008, 12:04 | 9.45 |
| EX AO2 | 0.01266 | 93.9 | 01Oct2008, 12:04 | 9.24 |
| EX AO3 | 0.00594 | 43.6 | 01Oct2008, 12:04 | 9.02 |
| EX AO4 | 0.01000 | 73.7 | 01Oct2008, 12:04 | 9.10 |
| EX AO5 | 0.00297 | 22.0 | 01Oct2008, 12:04 | 9.25 |
| EX AO6 | 0.00719 | 53.6 | 01Oct2008, 12:04 | 9.38 |
| EX AO7 | 0.00281 | 18.0 | 01Oct2008, 12:04 | 7.35 |
| PR AO1 | 0.00953 | 66.9 | 01Oct2008, 12:05 | 9.08 |
| PR AO2 | 0.01266 | 89.1 | 01Oct2008, 12:05 | 9.13 |
| PR AO3 | 0.00500 | 34.1 | 01Oct2008, 12:04 | 8.00 |
| PR AO4a | 0.00140 | 10.4 | 01Oct2008, 12:04 | 9.22 |
| PR AO4b | 0.00160 | 12.1 | 01Oct2008, 12:04 | 9.73 |
| Det 1 | 0.00300 | 14.4 | 01Oct2008, 12:09 | 9.41 |
| PR AO4c | 0.00700 | 46.9 | 01Oct2008, 12:06 | 9.12 |
| J_AO4 | 0.01000 | 59.9 | 01Oct2008, 12:07 | 9.21 |
| PR AO5a | 0.00250 | 18.6 | 01Oct2008, 12:04 | 9.27 |
| Det 2 | 0.00250 | 8.1 | 01Oct2008, 12:13 | 9.09 |
| PR AO5b | 0.00140 | 8.9 | 01Oct2008, 12:05 | 7.70 |
| J_AO5 | 0.00390 | 15.0 | 01Oct2008, 12:07 | 8.59 |
| PR AO6 | 0.00719 | 53.8 | 01Oct2008, 12:04 | 9.47 |
| PR AO7 | 0.00281 | 18.0 | 01Oct2008, 12:04 | 7.35 |

Project: AO PUD Simulation Run: PR 2YR
Reservoir: Det 1

| | | | |
|---|---|---|---|
| Start of Run: | 01Oct2008, 00:00 | Basin Model: | Ex & Pr Det |
| End of Run: | 02Oct2008, 00:00 | Meteorologic Model: | 2YR |
| Compute Time: | 06Jul2016, 13:24:30 | Control Specifications: | 24HR |

Volume Units: IN

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow: | 8.1 (CFS) | Date/Time of Peak Inflow: | 01Oct2008, 12:04 |
| Peak Discharge: | 1.1 (CFS) | Date/Time of Peak Discharge | 01Oct2008, 12:29 |
| Inflow Volume: | 2.41 (IN) | Peak Storage: | 0.19 (AC-FT) |
| Discharge Volume | 2.40 (IN) | Peak Elevation: | 727.7 (FT) |

Project: AO PUD Simulation Run: PR 2YR
Reservoir: Det 2

| | | | |
|---|---|---|---|
| Start of Run: | 01Oct2008, 00:00 | Basin Model: | Ex & Pr Det |
| End of Run: | 02Oct2008, 00:00 | Meteorologic Model: | 2YR |
| Compute Time: | 06Jul2016, 13:24:30 | Control Specifications: | 24HR |

Volume Units:IN

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow: | 6.4 (CFS) | Date/Time of Peak Inflow: | 01Oct2008, 12:04 |
| Peak Discharge: | 0.7 (CFS) | Date/Time of Peak Discharge | 01Oct2008, 12:36 |
| Inflow Volume: | 2.22 (IN) | Peak Storage: | 0.16 (AC-FT) |
| Discharge Volume | 2.22 (IN) | Peak Elevation: | 731.4 (FT) |

Project: AO PUD Simulation Run: PR 10YR
Reservoir: Det 1

| | | | |
|---|---|---|---|
| Start of Run: | 01Oct2008, 00:00 | Basin Model: | Ex & Pr Det |
| End of Run: | 02Oct2008, 00:00 | Meteorologic Model: | 10YR |
| Compute Time: | 06Jul2016, 13:24:17 | Control Specifications: | 24HR |

Volume Units: IN

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow: | 14.5 (CFS) | Date/Time of Peak Inflow: | 01Oct2008, 12:04 |
| Peak Discharge: | 5.3 (CFS) | Date/Time of Peak Discharge | 01Oct2008, 12:14 |
| Inflow Volume: | 5.36 (IN) | Peak Storage: | 0.32 (AC-FT) |
| Discharge Volume | 5.34 (IN) | Peak Elevation: | 728.8 (FT) |

Project: AO PUD Simulation Run: PR 10YR
Reservoir: Det 2

| | | | |
|---|---|---|---|
| Start of Run: | 01Oct2008, 00:00 | Basin Model: | Ex & Pr Det |
| End of Run: | 02Oct2008, 00:00 | Meteorologic Model: | 10YR |
| Compute Time: | 06Jul2016, 13:24:17 | Control Specifications: | 24HR |

Volume Units: IN

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow: | 11.9 (CFS) | Date/Time of Peak Inflow: | 01Oct2008, 12:04 |
| Peak Discharge: | 2.5 (CFS) | Date/Time of Peak Discharge: | 01Oct2008, 12:21 |
| Inflow Volume: | 5.15 (IN) | Peak Storage: | 0.30 (AC-FT) |
| Discharge Volume: | 5.10 (IN) | Peak Elevation: | 732.6 (FT) |

Project: AO PUD Simulation Run: PR 25YR
Reservoir: Det 1

| | | | |
|---|---|---|---|
| Start of Run: | 01Oct2008, 00:00 | Basin Model: | Ex & Pr Det |
| End of Run: | 02Oct2008, 00:00 | Meteorologic Model: | 25YR |
| Compute Time: | 06Jul2016, 13:24:36 | Control Specifications: | 24HR |

Volume Units: IN

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow: | 17.6 (CFS) | Date/Time of Peak Inflow: | 01Oct2008, 12:04 |
| Peak Discharge: | 8.6 (CFS) | Date/Time of Peak Discharge | 01Oct2008, 12:11 |
| Inflow Volume: | 6.95 (IN) | Peak Storage: | 0.36 (AC-FT) |
| Discharge Volume | 6.90 (IN) | Peak Elevation: | 729.1 (FT) |

Project: AO PUD Simulation Run: PR 25YR
Reservoir: Det 2

| | | | |
|---|---|---|---|
| Start of Run: | 01Oct2008, 00:00 | Basin Model: | Ex & Pr Det |
| End of Run: | 02Oct2008, 00:00 | Meteorologic Model: | 25YR |
| Compute Time: | 06Jul2016, 13:24:36 | Control Specifications: | 24HR |

Volume Units: IN

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow: | 14.5 (CFS) | Date/Time of Peak Inflow: | 01Oct2008, 12:04 |
| Peak Discharge: | 4.4 (CFS) | Date/Time of Peak Discharge | 01Oct2008, 12:17 |
| Inflow Volume: | 6.73 (IN) | Peak Storage: | 0.35 (AC-FT) |
| Discharge Volume | 6.63 (IN) | Peak Elevation: | 733.1 (FT) |

Project: AO PUD Simulation Run: PR 100YR
Reservoir: Det 1

| | | | |
|---|---|---|---|
| Start of Run: | 01Oct2008, 00:00 | Basin Model: | Ex & Pr Det |
| End of Run: | 02Oct2008, 00:00 | Meteorologic Model: | 100YR |
| Compute Time: | 06Jul2016, 13:24:24 | Control Specifications: | 24HR |

Volume Units: IN

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow: | 22.4 (CFS) | Date/Time of Peak Inflow: | 01Oct2008, 12:04 |
| Peak Discharge: | 14.4 (CFS) | Date/Time of Peak Discharge | 01Oct2008, 12:09 |
| Inflow Volume: | 9.49 (IN) | Peak Storage: | 0.42 (AC-FT) |
| Discharge Volume | 9.41 (IN) | Peak Elevation: | 729.7 (FT) |

Project: AO PUD Simulation Run: PR 100YR
Reservoir: Det 2

| | | | |
|---|---|---|---|
| Start of Run: | 01Oct2008, 00:00 | Basin Model: | Ex & Pr Det |
| End of Run: | 02Oct2008, 00:00 | Meteorologic Model: | 100YR |
| Compute Time: | 06Jul2016, 13:24:24 | Control Specifications: | 24HR |

Volume Units: IN

Computed Results

| | | | |
|---|---|---|---|
| Peak Inflow: | 18.6 (CFS) | Date/Time of Peak Inflow: | 01Oct2008, 12:04 |
| Peak Discharge: | 8.1 (CFS) | Date/Time of Peak Discharge | 01Oct2008, 12:13 |
| Inflow Volume: | 9.27 (IN) | Peak Storage: | 0.43 (AC-FT) |
| Discharge Volume | 9.09 (IN) | Peak Elevation: | 733.8 (FT) |