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Ameren COG Solar Project

Commercial Construction Site Plan Application

City of O'Fallon – Engineering Department

100 North Main Street
O'Fallon, Missouri 63366
www.ofallon.mo.us
636.379.5556

Commercial Construction Site Plan Application

RECEIVED
MAY 13 2014
BUILDING DEPARTMENT

(Please Type or Print)

Subject Property Information:

Property Location: 1621 Highway 79 O'Fallon, MO 63366

Name of Proposed Site: O'Fallon Renewable Energy Center

Site Area: 33.5 acres   Grading Plan Permit #   Date

Date of P&Z Approval: February 27, 2014   Current Zoning: I-1

Contact Information:

Applicant:
Company: MC Industrial
Contact Person: Russ Gentemann
Address: 3117 Big Bend Blvd.
City/State/Zip: St. Louis, MO 63143
Phone: (314) 646-4100
Fax:
E-mail: russ.gentemann@mc-industrial.com

Property Owner:
Company: Ameren Missouri
Contact Person: Scott Wibbenmeyer
Address: 1901 Chouteau Ave.
City/State/Zip: St. Louis, MO 63103
Phone: (314) 554-6635
Fax:
E-mail: swibbenmeyer@ameren.com

24 hour Emergency Contact:
Company: MC Industrial
Contact Person: Russ Gentemann
Address: 3117 Big Bend Blvd.
City/State/Zip: St. Louis, MO 63143
Phone: (314) 646-4100
Fax:
E-mail: russ.gentemann@mc-industrial.com

Engineer:
Company: Burns & McDonnell
Contact Person: Jeff Muse
Address: 425 S. Woods Mill Rd. Suite 300
City/State/Zip: Chesterfield, MO 63017
Phone: (314) 682-1500
Fax:
E-mail: jmues@burnsmcd.com

This *Commercial Construction Site Plan Application and Checklist* outlines the items typically addressed with an initial submittal of a *Commercial Construction Site Plan.* This checklist is a guide to the generally required information on a *Commercial Construction Site Plan*, but may not be inclusive of all the information that may be required to meet City Code. Please refer to *Chapter 405: Subdivision and Land Development Code*, of the O'Fallon *Municipal Code* for specific plan requirements.

Russell Gentemann
Applicant Signature   5/8/14 Date

Scott Wibbenmeyer
Owner's Signature   5/8/14 Date

OFFICE USE ONLY

Date of Initial Submittal: 5/13/14 Permit No.: 14-196CP Application Fee Amount: $ 27082.51 Date Paid: 6/18/14

Escrow Amount (from approved Cost Estimate): $ 207209.00   Date Escrow received: 7/8/14

MDNR Land Disturbance Permit required for sites 1 acre and larger: Provided (Y) (N) (N/A), Expiration Date 2/7/17

Application (Approved/Denied) by: [signature]   Date: 7/8/14   Permit Expiration Date: 7/8/16

Application Fee: **Two percent (2%) of the approved estimated cost of improvements for the development as reviewed by the Engineering Department and due prior to plan approval.**

After approval of the applicable site plan, preliminary plat or area plan and prior to City Council approval of the record plat, construction plans prepared by an engineer for the site or subdivision of all, or a specified stage, of the tract shall be submitted to the City Engineer. If substantive changes are to be made after approval of the construction plans, the City Engineer shall require revised plans to be submitted for approval.

Staff will conduct a comprehensive review of the applicant's submission of three (3) sets of plans and provide a listing of any items that will need to be corrected, modified, or amended in order to meet the City of O'Fallon standards and specifications as outline in Chapter 405: Subdivision and Land Development, of the O'Fallon Municipal Code. The *Commercial Construction Site Plans* will only be approved once all outstanding items have been addressed including the recording of any off-site easements or off-site Right of Way dedications to the satisfaction of the Engineering Department. Approvals that are required by other Municipal, County or State agencies which have jurisdiction in the area shall provide written confirmation of their approvals to the City prior to Final Approval of the Construction Plans by the City of O'Fallon. **In all cases first submittal must include the required sets of Construction Plans along with the *Commercial Construction Site Plan Application* with original signatures and a completed checklist or it will be rejected.**

The application shall be accompanied by the following information:

☐ Provide an estimated cost of improvements for the development to be approved. "*Improvements*" shall include any structural, material or physical change incident to servicing or furnishing facilities for the site, such as, but not limited to, the removal of trees and other vegetative cover, altering the natural or existing grade, siltation control, sediment basins, revegetation of the site, the installation of streets, curbs and gutters, installation and removal of temporary turnarounds, necessary offsite roadway improvements, traffic signals, traffic control signs, street name signs, street lights, sidewalks and handicap ramps, multi-purpose trails, any on-site and off-site water mains and appurtenances, proposed lift stations, force mains, access roads, sanitary sewer mains, wyes, manholes and any other necessary items to complete the sanitary system, storm sewer mains, catch inlets, culverts, bridges, outfall structures, detention facilities, lakes, waterways, canals, trees and landscaping, parking lot pavement and curbing, wheel stops, trash enclosures and any other improvements required or deemed necessary with the approved *Construction Site Plan*.

☐ This cost shall be estimated using the cost estimate calculator as published and updated by the City of O'Fallon. Items not in the cost estimate calculator will be estimated by the Consulting Engineer and reviewed and approved by the City of O'Fallon. The cost estimate calculator can be found at www.ofallon.mo.us/pubs/apps/Engineers_Estimate.xls.

The construction of all site or subdivision improvements shall be completed within two (2) years of the City Engineer's approval of the construction plans. Time extensions may be granted by the Community Development Department for those developments showing good cause as to why the improvements have not been completed. If construction under the approved construction plan is to continue beyond the two (2) year period, the developer must request an extension of the approved plan and provide for extending the escrow or other surety on the project prior to the expiration of the plan, otherwise work on the project must cease. Any request for an extension under this Section that is denied by City staff can be appealed to the Planning and Zoning Commission. The developer may request a period of construction longer than two (2) years with the initial approval at the Planning and Zoning Commission meeting by providing a suitable explanation for the request. On projects with an extended construction period, suitable escrows must be provided for the extended period. If construction is not actively pursued during the course of the extended period of construction approval (beyond the initial two (2) year period), the City may cancel the extension with thirty (30) days written notice to the developer. Any cancelled extension under this Section may be appealed to the Planning and Zoning Commission.

The following information is required for all *Commercial Construction Site Plan* submittals for approval. The required information may be combined for presentation on one (1) or more drawings or maps. The City Engineer may request that the information be presented on drawings or maps in addition to those submitted in the interest of clarity, speed and efficiency in the review process. Below is a listing of items that are to be addressed on all *Commercial Construction Site Plan* submittals to the Engineering Division for review.

CHECKLIST
(In the space provided, indicate which Sheet the item is located)

General Requirements

- [X] The construction plan shall be any scale from 1 inch = 10 feet through 1 inch = 100 feet, so long as the scale is an increment of ten (10) feet and is sufficiently clear in reflecting details of the proposed construction. Construction plans shall be prepared on exhibits twenty-three and one-half (30) inch by thirty-four and one-half (42) inch with north arrow and scale indicated. The site plan or title page shall be used as the cover sheet for the construction plan.
- [X] The submittal shall include all general notes and specifications, site plan(s), grading plan(s) with existing and proposed contours, water plan(s) and drainage area map(s) showing acreage of existing drainage areas to existing discharge points of the site and proposed drainage areas with acreage to each detention basin(s) and all details necessary for construction. Include profile sheets for streets, storm sewers and sanitary sewers.
- [ ] Prior to Construction Plan approval, provide copies of approval letters or necessary permits from all responsible reviewing agencies including, but not limited to, the appropriate fire protection district, school district, water supply district, sanitary sewer district, MoDOT, Army Corps of Engineers and/or Missouri Department of Natural Resources.
- [ ] ~~Prior to Construction Plan approval, provide a recorded copy of all required off-site easements necessary to cover sanitary sewers, storm sewers, water mains, detention facilities or any other utility for this development.~~
- [ ] ~~Provide right-of-way warranty deeds required with this development.~~
- [ ] ~~Provide a copy of any easements required with this development.~~
- [X] All plans, details and reports shall be sealed, signed with original signature (not stamped) and dated by a Registered Professional Engineer. (Per MO Econ. Dev. Requirement)

General Construction Plan Notes

- [X] Provide a location map of the site on the cover sheet with north arrow and scale indicated.
- [ ] ~~Add notes stating the development phase area, number of proposed lots and building setback information.~~
- [X] Provide the reference benchmark and site benchmark that is used on the Cover Sheet. The benchmarks used to tie in elevation information shall be on U.S.G.S. datum. The site benchmark shall be shown on the plan sheets.
- [X] Provide the City of O'Fallon construction working hours to the plans per City Ordinance 3429 as shown in Section 500.420 of the Municipal Code of the City of O'Fallon as follows:

  Construction work shall only be allowed during the following hours:

  October 1 -- May 31
  7:00 A.M. to 7:00 P.M. Monday—Sunday
  June 1 -- September 30
  6:00 A.M. to 8:00 P.M. Monday—Friday
  7:00 A.M. to 8:00 P.M. Saturday and Sunday

  Construction work to be done outside of these hours requires prior written approval from the City Administrator or City Engineer.
- [X] Provide tree preservation calculations.
- [X] Provide a listing of all utility companies and contact information serving the development. The City of O'Fallon shall also be contacted for utility locates under its maintenance responsibility. For water main, sanitary sewer and storm sewer locates, contact 636-281-2858, for ~~traffic locates, contact 636-379-5602~~. Contact the Engineering Division at 636-379-5556 and the Construction Inspection Division at 636-379-5596.
- [X] Add the following statement to the general notes: City approval of the construction site plans does not mean that any building can be constructed on the lots without meeting the building setbacks as required by the Zoning Code.
- [X] Note the appropriate F.I.R.M. panel number, flood zone and latest revision date for the property.
- [ ] ~~Provide parking calculations per ordinance requirements.~~

☐ ~~Provide a note stating, "All proposed utilities and/or utility relocations shall be located underground."~~

☒ List the requirements and conditions of approval from the Planning and Zoning Commission on the cover sheet.

☒ Provide the Planning and Development Division file number and the date the plan was approved by the Planning and Zoning Commission in lower right corner of the Cover Sheet.

☒ Provide a note stating, "If materials such as trees, organic debris, rubble, foundations and other deleterious material are not to be reused, they shall be removed from the site and disposed of in compliance with all applicable laws and regulations." If the materials listed previously are reused, a letter from a soils engineer must clarify amount, location, depth, etc and be approved with the construction plans. Landfill tickets for such disposal shall be maintained on file by the developer. Burning on site shall be allowed only by permit from the local fire district. If a burn pit is proposed the location and mitigation shall be shown on the grading plan and documented by the soils engineer.

☒ Provide a note stating, "No slopes shall exceed 3 (horizontal): 1 (vertical)."

☒ Provide a note stating, "All fill placed under proposed storm and sanitary sewers, proposed roads and/or paved areas shall be compacted to 90% of maximum density as determined by the Modified AASHTO T-180 Compaction Test or 95% of maximum density as determined by the Standard Proctor Test AASHTO T-99. All fill placed in proposed roads shall be compacted from the bottom of the fill up. All tests shall be verified by a soils engineer concurrent with grading and backfilling operations." Moisture content of the soil in fill areas is to correspond to the compactive effort as defined by the Standard or Modified Proctor Test. Optimum moisture content shall be determined using the same test that was used for compaction. Soil compaction curves shall be submitted to the City of O'Fallon prior to the placement of fill. Proof rolling may be required to verify soil stability at the discretion of the City of O'Fallon.

☒ Provide a note stating, "Developer must supply City construction inspectors with an Engineer's soil reports prior to and during site soil testing." The soils report will be required to contain the following information on soil test curves (Proctor reports) for projects within the City:

- Maximum dry density.
- Optimum moisture content.
- Maximum and minimum allowable moisture content.
- Curve must be plotted to show density from a minimum of 90% as determined by the "Modified AASHTO T-180 Compaction Test" (A.S.T.M.-D-1157) or from a minimum of 95% as determined by the "Standard Proctor Test AASHTO T-99, Method C" (A.S.T.M.-D-698). Proctor type must be designated on the document.
- Curve must have at least 5 density points with moisture content and sample locations listed on document.
- Specific gravity.
- Natural moisture content.
- Liquid limit.
- Plastic limit.

Be advised that if this information is not provided to the City's Construction Inspector the City will not allow grading or construction activities to proceed on any project site.

☒ Provide a note stating, "The Permittee shall assume complete responsibility for controlling all siltation and erosion of the project area. The Permittee shall use whatever means necessary to control erosion and siltation including, but not limited to, staked straw bales and/or siltation fabric fences (possible methods of control are detailed in the plan). Control shall commence with the clearing operations and be maintained throughout the project until acceptance of the work by the City of O'Fallon and as necessary by MoDOT. The Permittee's responsibilities include all design and implementation as required to prevent erosion and the depositing of silt. The City of O'Fallon and as required by MoDOT may at their option direct the Permittee in his methods as deemed fit to protect property and improvements. Any depositing of silt or mud on new or existing pavement shall be removed immediately. Any depositing of silts or mud in new or existing storm sewers or swales shall be removed after each rain and affected areas cleaned to the satisfaction of the City of O'Fallon and as required by MoDOT."

- [ ] Provide a note stating, "All erosion control systems are inspected and corrected weekly, especially within 48 hours of any rainstorm resulting in one-half inch of rain or more. Any silt or debris leaving the site and affecting public rights-of-ways or storm water drainage facilities shall be cleaned up within 24 hours after the end of the storm."
- [X] Provide a note stating, "Any existing wells and/or springs which may exist on the property must be sealed in a manner acceptable to the City of O'Fallon Construction Inspection Department and following Missouri Department of Natural Resources standards and specifications."
- [X] Provide a note stating, "All paving to be in accordance with St. Charles County standards and specifications except as modified by the City of O'Fallon ordinances."
- [X] Provide a note stating, "Sidewalks, curb ramps and accessible parking spaces shall be constructed in accordance with currently approved Americans with Disabilities Act Accessibility Guidelines along with the required grades, signage, specifications and construction materials. If any conflict occurs between the above information and the plans, the ADAAG guidelines shall be followed and the contractor, prior to any construction, shall notify the Project Engineer."
- [X] Provide a note stating, "All installations and construction shall conform to the approved engineering drawings. However, if the developer chooses to make minor modifications in design and/or specifications during construction, he/she shall make such changes at his/her own risk, without any assurance that the City Engineer will approve the completed installation or construction. It shall be the responsibility of the developer to notify the City Engineer of any changes from the approved drawings. The developer may be required to correct the installed improvements so as to conform to the approved engineering drawings. The developer may request a letter from the Construction Inspection Division regarding any field changes approved by the City inspectors.
- [X] Provide a note stating, "Traffic control is to be per MoDOT or MUTCD whichever is more stringent."
- [X] Provide a note stating, "All traffic signals, street signs, sign post, backs and bracket arms shall be painted black using Carboline Rustbond Penetrating Sealer SG and Carboline 133 HB paint (or equivalent as approved by the City of O'Fallon and MoDOT).
- [ ] ~~Note that all sanitary laterals and sanitary mains crossing under pavement must have proper rock backfill and required compaction.~~
- [ ] ~~Include a note stating that "Lighting values will be reviewed on site prior to the final occupancy inspection.~~"
- [ ] ~~Note the estimated sanitary flow in gallons per day on the plan.~~
- [ ] ~~Provide a note stating, "Connections at all sanitary or storm structures to be made with A-lock joint or equal."~~
- [X] Provide a note stating, "Brick shall not be used in the construction of sanitary or storm sewer structures". Pre-cast concrete structures are to be used unless otherwise approved by the City.
- [X] Provide a note stating, "All concrete pipes will be installed with O-ring rubber type gaskets."
- [ ] ~~Provide a note stating, "HDPE pipe is to be N-12WT or equal and to meet ASTM F1417 water tight field test."~~
- [ ] ~~Provide the Water Jetting specifications as a note as shown in Section 405.210(D)(1).~~
- [X] Provide a note stating, "Rip-rap shown at flared ends will be evaluated in the field by the Engineer, Contractor and City Inspector after installation for effectiveness and field modified, if necessary, to reduce erosion on and off-site."
- [ ] ~~Provide a marking on the storm sewer inlets. The City will allow the following markers and adhesive procedures only as shown in the table below or an approved equal. 'Peel and stick' adhesive pads will not be allowed.~~

Manufacturer	Size	Adhesive	Style	Message (Part #)	Website
ACP International	3 7/8"	Epoxy	Crystal Cap	No Dumping Drains To Waterways (SD-W-CC)	www.acpinternational.com
DAS Manufacturing, Inc.	4"	Epoxy	Standard Style	No Dumping Drains To Stream (#SDS)	www.dasmanufacturing.com

☐ ~~Provide a note stating, "A 5/8" trash bar shall be centered within the opening(s) of all curb inlets and area inlets."~~

☐ ~~Provide a note stating, "All identification or directional sign(s) must have the locations and sizes approved and permitted separately through the Planning and Development Division."~~

[X] Include a note stating that "No graded areas are to remain bare for over 14 days without being seeded and mulched."

[X] Provide a note stating, "All proposed fencing requires a separate permit from the Planning & Development Division."

Construction Plan Requirements (Site Plan, Grading Plan, Water Plan, Drainage Area Plan)

☐ ~~If the existing road does not have a curb, the new entrance curb shall begin 10' from the edge of existing pavement.~~

[—] ~~Show the locations of all existing entrances on both sides of the street, within 300 feet of any proposed entrance.~~

[—] ~~Show the limits of any cross access easements required for this development on the plan.~~

[—] ~~All street stub-outs over 250' in length will require a temporary turnaround.~~

[—] ~~Provide any construction signage required for any work proposed within the right-of-way.~~

[—] ~~Label handicap ramps and types at all intersections.~~

[—] ~~Show the locations with stationing of all Type "A" joints.~~

[—] ~~Show the locations of all proposed traffic calming within the development.~~

[—] ~~Show the proposed traffic control sign layout. Signs designating street names shall be placed on the top of the traffic control signs. Provide a striping plan for cross walks as necessary.~~

[—] ~~Show proposed streetlight locations and approximate location of the conduit system (for the street lights). Pedestals, junction boxes and transformers associated with the street lights can be shown on the as-builts. Streetlights should be located at all intersections and in cul-de-sacs. Placement of street lights shall be on the extension of the property line between the curb and sidewalk a maximum of three hundred (300) feet apart.~~

[—] ~~Show the location of a multi-use trail (when required) on the plans.~~

[X] Provide a plan showing the placement of all required trees. This includes street trees and any trees placed within common areas to fulfill the tree preservation requirements.

☐ ~~Provide pavement striping at any point where the multi-use trail crosses existing or proposed pavement.~~

[X] Provide the location of the temporary construction entrance and parking area.

[X] Grades for entrances should not exceed 2% at walks and 4% for the street. Typically 2% from the back of curb to the right of way is desired.

☐ ~~Indicate how the site will be served by electric.~~

☐ ~~Beginning at the existing pavement, provide a 20' wide x 50' long aggregate wash off area using 2" clean rock, approximately 6" deep for use during construction. If placed at points of ingress or egress, width shall not be less than full width of proposed pavement. Include a detail in the plans. Provide a note to the plans and detail, "If water is not available, a water truck will be provided."~~

☐ ~~Provide site triangle and line of sight easements at all intersections with existing and proposed roads.~~

[—] ~~Provide entrance monument easements, as necessary, at all entrances. The entrance monument easement shall not be located within the sight triangle or line of site easement at intersections.~~

[—] ~~If stub streets are planned for future extensions, the pavement for those streets shall be extended as close to the property line as possible to allow for grading and drainage. On-site grading easements shall be provided on the proposed lots adjacent to the stub street right-of-way to allow for future grading in conjunction with the connection of the stub street.~~

[X] Show the location and size of all existing water mains. Provide a water main layout, with size of main, tees, valves, blow-offs, etc. per City of O'Fallon specifications. City water mains shall have 42" minimum cover.

[—] ~~Show the location of the nearest existing fire hydrant and any fire hydrants proposed for the development. Fire hydrant spacing shall not exceed 600' or 300' from any proposed building.~~

[—] ~~Show water meter locations for sites within the City of O'Fallon Water District.~~

[X] Show the location of any existing wells, cisterns and/or springs on the property or provide a note that no wells, cisterns and/or springs exist on the property.

[X] Show the location of all siltation control devices (silt fences, sediment basins, etc.) following St. Charles County Soil and Water Conservation District Erosion and Sediment Control guidelines.

[ ] ~~All swales shall be a minimum of two (2) percent. Provide spot elevations of the swale at each property line to show positive drainage. Flow patterns shall be shown on both the grading plan and drainage area map.~~

[X] Use the City's P.I. factors (Section 405.230) for the drainage area calculations.

[ ] ~~Label all bypass flows on the drainage area map. Bypass flows shall be limited to 0.25 c.f.s. maximum.~~

[—] ~~No more than one (1) c.f.s of storm water (bypass included) may pass through an intersection.~~

[—] ~~All storm sewers, sanitary sewers and/or water mains shall be a minimum of ten (10) feet from the front of any existing or proposed building (front building line).~~

[—] ~~Water mains, storm sewers and sanitary sewers shall run diagonally across side yard lot lines to maximize the typical side yard easement.~~

[—] ~~All storm sewers, sanitary sewers and water mains shall cross the pavement perpendicular to the centerline. Offsets up to 15 degrees may be considered. Pipe runs and connections under street pavement shall be the minimum needed.~~

[—] ~~Provide clean-outs for all sanitary laterals over 100' and for all bends in the laterals.~~

[—] ~~Provide Drainage structures in swales when surface flow exceeds three (3) cubic feet per second.~~

[X] The discharge point of all flared end sections shall be protected by rip rap or other approved means. Provide calculations showing velocity reductions.

[ ] ~~Provide a 20' wide access strip to the detention basin.~~

[—] ~~Show the normal water elevation and minimum depth for all proposed lakes.~~

[—] ~~Show the proposed high water elevations for all required storms, including 100 year low flow blocked. Provide a 20' drainage easement surrounding the design high water elevation.~~

[—] ~~Provide emergency storm water relief swales at all low points. The swale shall be sized to carry the 15yr/20min storm with one (1) foot of freeboard to the low sill of the building.~~

[—] ~~Provide an undisturbed drainage easement and creek bank setbacks for any existing creeks that are to remain in the development. (Ordinance #5271 Section 405.247)~~

[X] All developments are required to provide long term post construction BMP's such as; low impact design, source controls and treatment controls that protects water quality and controls run off to the maximum extent practical. (Ordinance 5082-Section 405.245) Indicate on the plans how this site will be in compliance with the Phase II Illicit Storm water discharge guidelines.

[X] Provide calculations for all Post Construction Best Management Practices.

[ ] Provide a maintenance schedule for all Post Construction Best Management Practices.

[X] Provide the appropriate number of handicap parking spaces with a minimum of one space being a van accessible space. Handicap parking spaces are to be 9' wide with a 5' or 8' striped loading aisle.

[ ] Provide an executed copy of the Stormwater BMP Maintenance Agreement.

[X] Dimension all parking spaces a minimum of 9' wide and 19' long and the drive aisle a minimum of 25' wide.

Profile Requirements

[ ] ~~The minimum pipe size for sanitary mains shall be 8" with one (1) percent slopes. Sanitary laterals shall be a minimum of 6" with two (2) percent slopes. Sanitary sewer pipe slopes may be reduced per MSD requirements.~~

[X] The minimum requirements for storm sewers shall be 12" pipe diameter and one (1) percent pipe slope or a velocity of three (3) feet per second.

[X] No flat based structures are allowed. The flow lines of incoming and outgoing storm sewers and sanitary sewers shall maintain a 0.20' drop through the structure.

[X] All storm sewers shall have 36" minimum cover. Class IV pipe used for cover less than 36". All sanitary sewers shall have a minimum of 42" cover.

[X] All structures and flared end sections shall be concrete. H.D.P.E pipe will not be allowed for detention basin outflows or final pipe run to creek discharge.

[—] ~~The flow line of any flared end section draining into a lake shall be at or above the normal water elevation of the lake.~~

[—] ~~When the sanitary main enters a drop structure, 20 feet of ductile iron pipe with granular backfill within the disturbed area below the sanitary main will be required. Drop manholes must be 48" I.D. minimum.~~

[—] ~~Encase with concrete both sanitary and storm sewer at crossing when storm sewer is within 18 inches above sanitary sewer. Add concrete cradle to only RCP storm sewer and encase HDPE storm sewer when it is more than 18 inches above sanitary line. Provide 20 feet of ductile iron pipe where the sanitary main crosses over storm sewer lines.~~

[—] ~~Sanitary mains at creek crossing must be concrete encased ductile iron pipe.~~

[—] ~~Sanitary manholes built within the 100 year flood plain limits must have lock-type watertight manhole covers.~~

[—] ~~Add rock backfill to all storm and sanitary sewers within 10 ft. of the edge of pavement and that lie within the 1:1 shear plane of the road.~~

[—] ~~Concrete cradle or encasement shall be required when pipe slopes exceed twenty (20) percent. Pipe slopes greater than fifty (50) percent will require special approval for the design.~~

[—] ~~Provide anti-seepage collars on the outflow pipes from all lakes.~~

[—] ~~Show the lake depth and normal pool elevation (as necessary) and the design high water elevations of all required storms on the profile sheets.~~

[—] ~~Label all sanitary and storm profiles as public or private.~~

Detail Requirements

[X] Provide a vegetative establishment table showing seeding, mulch and fertilizer rates and optimum seeding dates following St. Charles County Soil and Water Conservation District Erosion and Sediment Control guidelines.

[X] Provide details for all siltation control devices (silt fences, sediment basins, etc.) following St. Charles County Soil and Water Conservation District Erosion and Sediment Control guidelines.

[ ] ~~Include an enlarged entrance detail for all proposed intersections with existing streets. This should include spot elevations on both the centerline and edge of the intersecting road, a saw cut line, all necessary dimensions and rounding elevations. Provide a detail of the proposed pavement within the existing right-of-way. Provide sight lines, in plan and profile form, for all proposed streets intersecting with existing streets. Note that pavement removal is to be to the nearest joint.~~

[X] The pavement depth and composition of proposed streets intersecting existing streets within the existing right-of-way shall be in accordance with the Comprehensive plan.

[X] Provide typical pavement sections for all types of pavement. The minimum allowable asphalt pavement section for parking lots is 3" of Type C asphalt over an 8" rock base. All parking lot drive aisles are to be a minimum of 4" of Type C asphalt over an 8" rock base.

- Provide a note with the concrete details stating “All non-reinforced concrete shall be 4,000 p.s.i. at 28 days.”
- [X] Provide a note with the asphalt details stating “The asphalt surface shall be compacted to 98% maximum density.”
- [X] All entrance pavement sections within the right of way shall be a minimum of 7” PCC Pavement on a compacted 4” rock base or are to match the pavement thickness of the adjoining street which ever is greater, unless otherwise approved with the site plan.
- [X] Provide typical pavement details, showing jointing and curbing placement and construction.
- [ ] ~~Provide details for all proposed traffic calming within the development.~~
- [—] ~~Provide the City of O’Fallon street name identification sign placement detail.~~
- [X] Provide handicap parking signs with a fine legend of $50-$300 shown.
- [ ] ~~Provide a concrete sidewalk detail with joint spacing shown.~~
- [—] ~~Provide details for handicap ramps that comply with Americans with Disabilities Act Accessibility Guidelines.~~
- [—] ~~Truncated Domes for curb ramps located in public right of way shall meet ADA requirements and shall be constructed using red pre cast truncated domes such as those manufactured by Armor Tile or approved equal.~~
- [—] ~~Provide a multi-use trail detail (when required) showing a minimum of 3” Type “C” Asphalt over a 4” aggregate base.~~
- [—] ~~Provide a temporary turnaround detail when required.~~
- [—] ~~Provide a flared end section detail noting that cutoff walls are 2’ deep upstream and 3’ deep downstream.~~
- [—] ~~Provide a trench detail for all sanitary sewers, storm sewers and water mains. City sanitary sewers and water mains are required to have 12” of rock over the top of the pipe.~~
- Provide details for water main construction, including details for fire hydrants, valves, thrust blocks, etc. All water valve boxes shall be cast iron.
- [X] Provide details and manufacturing specifications for H.D.P.E pipe.
- [ ] ~~Provide a note on the detail sheets that a 5/8” trash bar shall be centered within the opening(s) of all inlets.~~
- [X] Remove any reference to brick construction for manholes or inlets and pre-cast concrete inlet or manhole covers.
- [X] Provide a detail of all proposed fences.
- [—] ~~Provide a detail of the trash enclosure. The screening walls around the trash enclosure shall reflect the same level of architectural design as the primary structure.~~

Additional Information Required

- [ ] ~~Provide hydraulic calculations for all proposed storm sewers and include inlet capacities for each structure. Provide Two (2) foot of free board from the hydraulic grade line to the sill of all Area Inlets, Curb Inlets and Manhole tops.~~
- [—] ~~Include on the Hydraulic Sheet(s) and on the Construction Plans a minimum of two (2) pipe runs downstream of the proposed connection(s) to off-site storm sewers and indicate the pipe capacities of the offsite storm sewer system being connected to.~~
- [X] All culverts shall meet the City of O’Fallon guidelines. Entrance control shall be checked with a minimum of two (2) feet of freeboard to the shoulder line. (Check inlet and outlet control)

Detention Requirements

- [X] Provide detention basin calculations for the 2, 15 and 25 year 20 minute storms within the initial phase of development. Maximum ponding elevation shall be calculated using the 100 year low flow blocked. For sites located within the Belleau Creek or the Peruque Creek watersheds, the 100 year, 20 minute storm must be detained. No credit will be given for areas of the detention basin below the base flood elevation.
- [X] Provide pre-development and post development drainage area maps, including off-site areas, with the detention

calculations.

[X] The P.I. values and Detention Basin quantity calculations shall match the Drainage Area Plan.

[ ] ~~Provide a detail and hydraulic calculations for the vegetated swale in the detention basin. The swale shall be designed to hold the 2-year 20 minute storm and have a minimum 1% longitudinal slope and be lined with a permanent erosion control blanket that will allow infiltration of the storm water.~~

[X] All detention basins shall be designed to hold two years of sediment storage without jeopardizing the required detention storage and freeboard. Provide sediment storage calculations in the detention report.

[—] ~~Provide the minimum required depth and normal water elevation for all proposed lakes in the Detention Report.~~

[X] Provide three (3) cross sections, tied to the property line, through each detention basin. As-Builts will be required for all cross sections prior to final approval of the detention basin(s). Provide a detail of the outfall structure(s) on the plan and in the detention report.

[ ] ~~Spillway discharge for wet detention basins shall be designed to safely pass the required storms. A cross section of the spillway shall be shown on the plans with elevations of the required storms.~~

Floodplain Information

[—] ~~Provide a completed Floodplain Development Application from the City of O'Fallon for any work proposed within the floodplain limits. A no-rise certificate signed, sealed and dated by a Missouri Registered Professional Engineer will be required prior the issuance of a Floodplain Development Permit for any activity within the Floodway.~~

[—] ~~Provide a copy of the US Army Corps of Engineers 404 permit and Missouri Department of Natural Resources 401 permit, or provide a letter of no permit required.~~

[—] ~~Demonstrate compliance with Article 415 of the City Code, specifically compensatory storage for any fill placed in the special flood hazard area.~~

[—] ~~Show the proposed and existing floodplain and floodway limits with base flood elevation on the plan as shown on the effective FIRM.~~

[—] ~~Provide a LOMR from FEMA for any land removed from the floodplain. Any cost to the City due to public notification or letters required by FEMA, to be sent by or published by the City will be reimbursed by the developer.~~

[—] ~~An elevation certificate signed, sealed and dated by a Missouri Registered Professional Engineer will be required showing that all structures will have a lowest floor elevation a minimum of one (1) foot above the base flood elevation.~~

Retaining Walls

[—] ~~Provide a wall on the plan view with the following information:~~

- ~~Top of wall and bottom of wall ground elevations.~~
- ~~Storm water drainage away from or around wall. Storm water shall not flow over wall.~~
- ~~Walls in excess of 6' (30" when supporting a walking surface) shall have a 4' high fence or handrail on top.~~
- ~~Existing and proposed grades.~~

[—] ~~Provide a wall profile with the following information:~~

- ~~Top of wall and footing elevations.~~
- ~~Show the steps in the footing.~~
- ~~Location of the geogrid designated on the profile.~~
- ~~Existing and proposed grades.~~

[—] ~~Provide details of any proposed retaining walls.~~

- [ ] ~~Provide retaining wall structural calculation with a 1.5 overturn factor of safety, per IBC code, signed, sealed and dated by a Missouri Registered Professional Engineer.~~

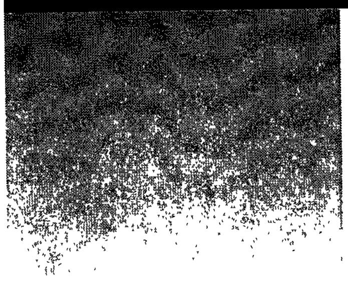
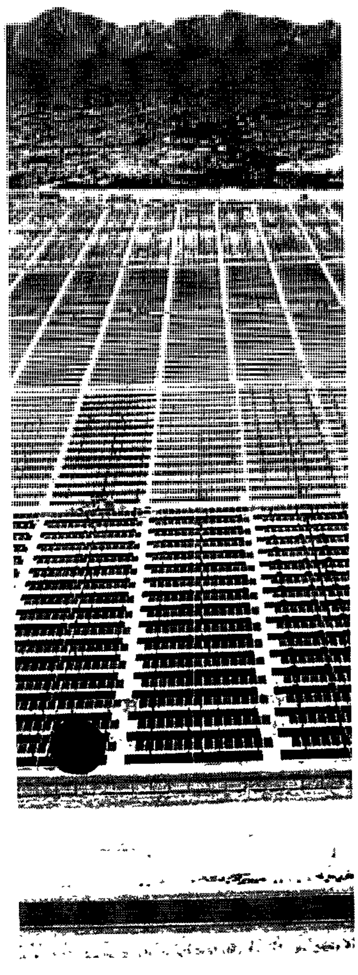


Table of Contents



MC
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Engineers Cost Estimate
O'Fallon Renewable Energy Center
Ameren Missouri

Site Plan Estimate / Commercial Site Escrow

Unit Description	Unit Price	Unit	Add. Cost	No. of Units		Total
Streets						
* Tack Coat	$1.50	gal		80		$120.00
* Prime Coat	$2.50	gal		690		$1,725.00
Concrete Pavement - 8" PCC (Non-Reinforced) (ARS)	$38.50	sq yd		90		$3,465.00
Subgrade Excavation	$2.80	cu yd		690		$1,932.00
Saw Cutting	$5.75	lin ft		70		$402.50
Type 1 Aggregate Base - 4"	$4.40	sq yd		90		$396.00
Removal of Concrete Curb & Gutter	$18.50	lin ft		70		$1,295.00
4" Bituminous Asphalt Pavement	$20.00	sq yd		1980		$39,600.00
Type 1 Aggregate Base - 8"	$8.80	sq yd		1980		$17,424.00
				Streets		*$66,359.50*
Storm Sewers						
18" Flared End Section	$621.00	each		4		$2,484.00
24" Flared End Section	$724.00	each		1		$724.00
30" Flared End Section	$931.00	each		1		$931.00
* Toe Wall	$220.00	cu yd		0.7		$154.00
* Rip-Rap and Filter Fabric at Flared Ends	$50.00	sq yd		41		$2,050.00
18" RCP	$40.00	lin ft		105		$4,200.00
24" RCP	$50.00	lin ft		100		$5,000.00
30" RCP	$55.00	lin ft		44		$2,420.00
Riprap - Heavy Stone (Slope Protection)	$57.00	sq yd		800		$45,600.00
* [illegible]er-drain System	$2,000.00	each		2		$4,000.00
[illegible]rete Discharge Structure	$6,000.00	LS		2		$12,000.00
Concrete Wing Walls with Floor	$1,000.00	LS		2		$2,000.00
Biroretention Fill	$158,000.00	Acre		0.517		$81,686.00
				Storm Sewers		*$163,249.00*
Water						
* Connect to Existing Main	$500.00	each		1		$500.00
* Tracer Wire	$1.00	lin ft		1170		$1,170.00
* Bacteria Test	$500.00	each	$500	1		$1,000.00
* Pressure Test	$2,000.00	each	$500	1		$2,500.00
2" Copper (Type K) Water Service Line	$22.00	lin ft		1170		$25,740.00
Water Meter	$750.00	LS		1		$750.00
Water Meter Vault	$1,500.00	LS		1		$1,500.00
Yard Hydrant	$50.00	LS		1		$50.00
				Water		*$33,210.00*
Rough Grading						
* Clearing	$3,000.00	# of Acres		3.5		$10,500.00
Subgrade Preparation	$0.75	sq yd		111500		$83,625.00
On-Site Excavation/Compacted Fill	$2.00	cu yd		45000		$90,000.00
Type 5 Aggregate Base (6" thick) - Yard Rock	$4.00	sq yd		110710		$442,840.00
Geotextile Fabric	$1.50	sq yd		119000		$178,500.00
Type 2 Rock Ditch Liner (12" thick)	$30.00	cu yd		600		$18,000.00
Silt Fence	$2.00	lin ft		3700		$7,400.00
				Rough Grading		*$830,865.00*
Vegetation						
Seeding - common ground	$0.62	sq yd		12100		$7,502.00
Erosion Control Blanket	$2.00	sq yd		8760		$17,520.00
				Vegetation		*$25,022.00*

Prepared by:
Burns McDonnell Inc.
St. Louis, MO

Engineers Cost Estimate

O'Fallon Renewable Energy Center

Ameren Missouri

Site Plan Estimate / Commercial Site Escrow

Unit Description	Unit Price	Unit	Add. Cost	No. of Units		Total
Common Ground Improvements						
Silt Removal and Restoration (Retention/Detention Basins)	$25,000.00	# of Acres	$10,000	0.8		$30,000.00
Trees - 2.0" – 2.5" diameter	$180.00	each		5		$900.00
Landscaping	$10.00	sq ft		2000		$20,000.00
Striping	$3.00	per stall		8		$24.00
				Common Ground Improvements		*$50,924.00*
Other						
Commercial Estimate - Handicap Signs	$100.00	each		1		$100.00
Fence, Chain Link - 7' high w/ 3 strand barb wire	$38.00	LS		4642		$176,396.00
Gates, Chain Link	$8,000.00	LS		1		$8,000.00
				Other		*$184,496.00*

Streets	$66,359.50
Storm Sewers	$163,249.00
Water	$33,210.00
Rough Grading	$830,865.00
Vegetation	$25,022.00
Common Ground Improvements	$50,924.00
Other	$184,496.00
Total	$1,354,125.50

Prepared by:
Burns McDonnell Inc.
St. Louis, MO

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Burns & McDonnell SINCE 1898	Client	MCI - Ameren		Page	1 of 1
	Project	Amern COG Solar	Date 04/21/14	Made By	C. Hartmann
				Checked By	
		Tree Preservation Calculation - Updated		Preliminary	Final X

Existing Tree Count on Property:

- Along East Property Line (South Half) → **84 trees - 8" or greater**
- Along North Property Line (East Side) → **30 trees - 8" or greater**
- Along East Property Line (North Half) → **40 trees - 8" or greater**
- North of Previous Clearing Limits → 11 - 8" trees per 2500 SF
  - Area = 2.0 Acres = 87555 SF → **385 trees - 8" or greater**

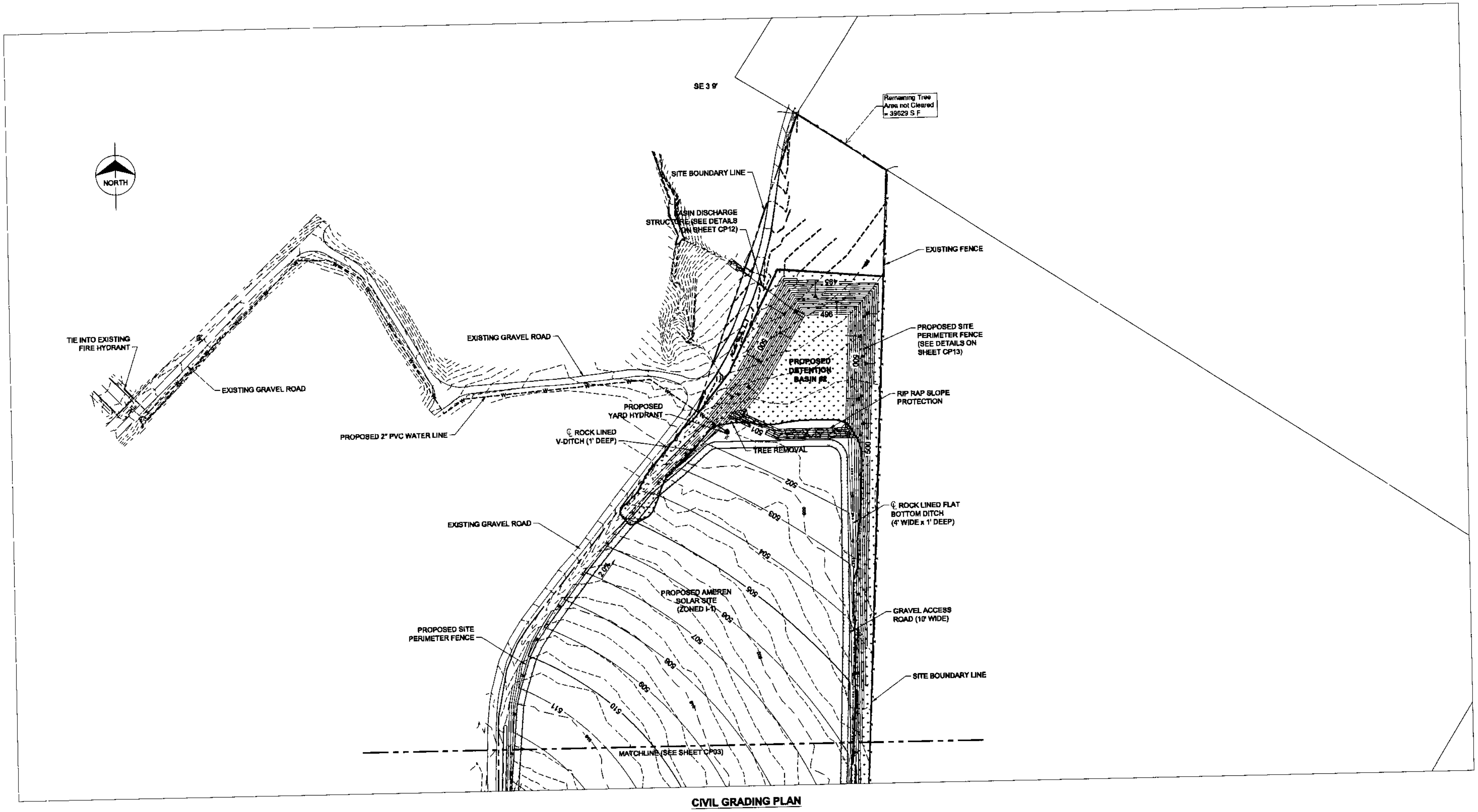
Total Trees on Property 8" or greater = (84 + 30 + 40 + 385) = **539 Trees**

Trees Remaining on Property:

- North of Detention Basin #2 → 11 - 8" trees per 2500 SF
  - Area Not Cleared = 39629 SF → Approx. **174 trees - 8" or greater remaining**

Percent of Trees Remaining = 174 trees / 539 total = **32.3% Remaining**

- Remaining Trees > than 20% requirement (per City of O'Fallon Development Code Section 402.040)



CIVIL GRADING PLAN

0 60' 120'
SCALE IN FEET

PRELIMINARY - NOT FOR CONSTRUCTION

BMCD# 77061

Burns & McDonnell

REV	PROJ ID	DATE	DRWN	RVW	APPD
D		04-17-14	CAH	MRH	-
ISSUED FOR 90% REVIEW					
C		03-26-14	CAH	JRM	
ISSUED FOR 60% REVIEW					
B		01-21-14	CAH	JRM	
P&Z COMMENTS ADDRESSED					
A		01-03-14	CAH	JRM	-
ISSUED FOR REVIEW					

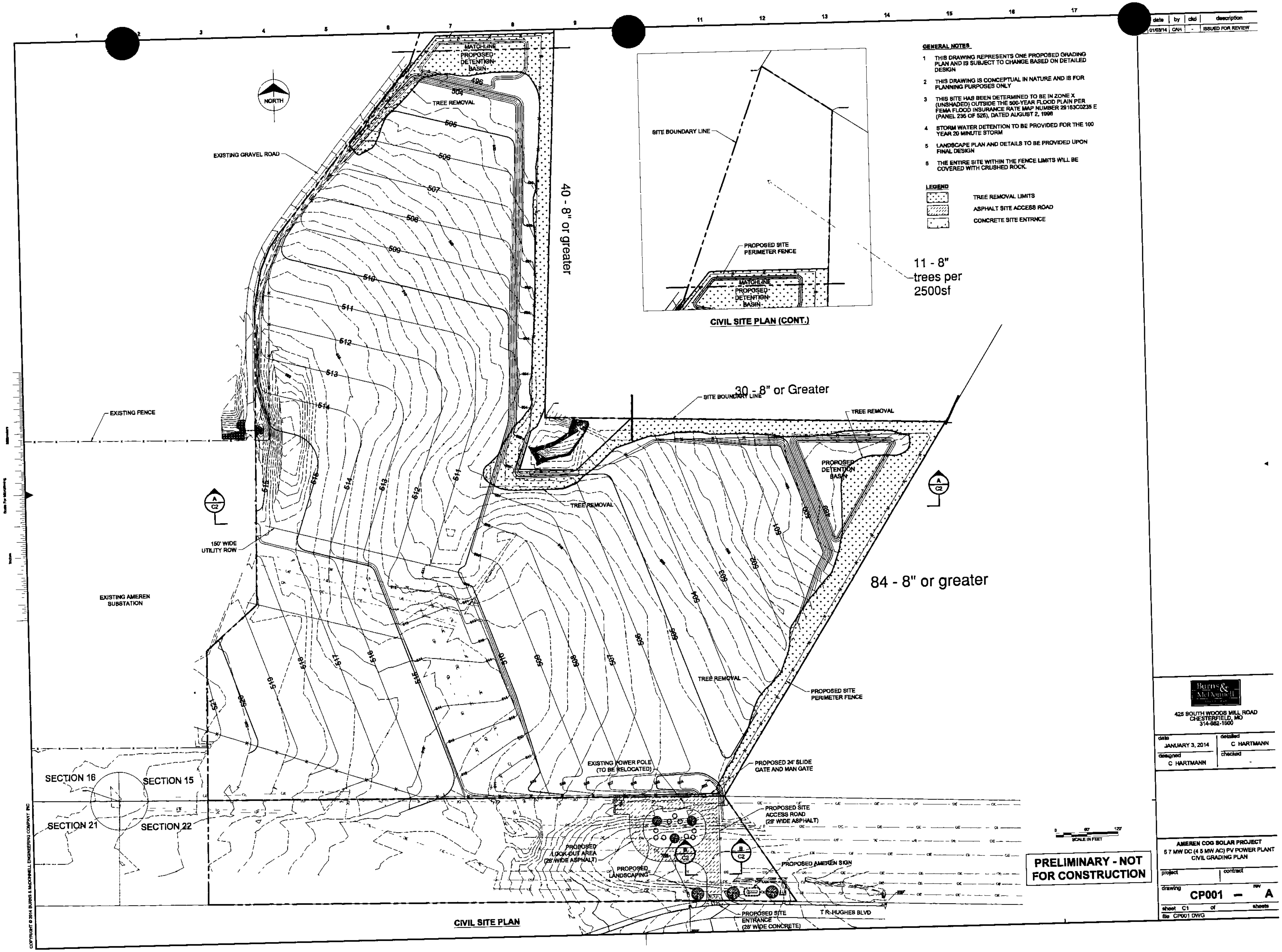
AMEREN COG SOLAR PROJECT
5 7 MW DC (4 5 MW AC) PV POWER PLANT
CITY OF O'FALLON, MISSOURI

CIVIL GRADING PLAN

Ameren MISSOURI

CP04

REV D


GENERAL NOTES
1 THIS DRAWING REPRESENTS ONE PROPOSED GRADING PLAN AND IS SUBJECT TO CHANGE BASED ON DETAILED DESIGN
2 THIS DRAWING IS CONCEPTUAL IN NATURE AND IS FOR PLANNING PURPOSES ONLY
3 THIS SITE HAS BEEN DETERMINED TO BE IN ZONE X (UNSHADED) OUTSIDE THE 500-YEAR FLOOD PLAIN PER FEMA FLOOD INSURANCE RATE MAP NUMBER 29183C0235 E (PANEL 235 OF 525), DATED AUGUST 2, 1996
4 STORM WATER DETENTION TO BE PROVIDED FOR THE 100 YEAR 20 MINUTE STORM
5 LANDSCAPE PLAN AND DETAILS TO BE PROVIDED UPON FINAL DESIGN
6 THE ENTIRE SITE WITHIN THE FENCE LIMITS WILL BE COVERED WITH CRUSHED ROCK.
LEGEND
TREE REMOVAL LIMITS
ASPHALT SITE ACCESS ROAD
CONCRETE SITE ENTRNCE
11 - 8" trees per 2500sf
CIVIL SITE PLAN (CONT.)
SITE BOUNDARY LINE
PROPOSED SITE PERIMETER FENCE
MATCHLINE PROPOSED DETENTION BASIN
40 - 8" or greater
30 - 8" or Greater
84 - 8" or greater
NORTH
TREE REMOVAL
EXISTING GRAVEL ROAD
EXISTING FENCE
150' WIDE UTILITY ROW
EXISTING AMEREN SUBSTATION
PROPOSED DETENTION BASIN
EXISTING POWER POLE (TO BE RELOCATED)
PROPOSED 24' SLIDE GATE AND MAN GATE
PROPOSED SITE ACCESS ROAD (28' WIDE ASPHALT)
PROPOSED LOOK-OUT AREA (28' WIDE ASPHALT)
PROPOSED LANDSCAPING
PROPOSED AMEREN SIGN
PROPOSED SITE ENTRANCE (28' WIDE CONCRETE)
T.R. HUGHES BLVD
SECTION 16
SECTION 15
SECTION 21
SECTION 22
CIVIL SITE PLAN
SCALE IN FEET
PRELIMINARY - NOT FOR CONSTRUCTION
date | by | ckd | description
01/03/14 | CAH | - | ISSUED FOR REVIEW
Burns & McDonnell
425 SOUTH WOODS MILL ROAD CHESTERFIELD, MO 314-682-1500
date JANUARY 3, 2014
detailed C HARTMANN
designed C HARTMANN
checked -
AMEREN COG SOLAR PROJECT
5.7 MW DC (4.5 MW AC) PV POWER PLANT
CIVIL GRADING PLAN
drawing CP001 - A
sheet C1
file CP001.DWG
COPYRIGHT © 2014 BURNS & McDONNELL ENGINEERING COMPANY, INC

Burns & McDonnell
SINCE 1898

041111 Form GCO-29

Client MCI - AMEREN Page 1 of 1
Project AMEREN COG SOLAR Date 1/21/2014 Made By J. MILES
Checked By C. HARTMANN
TREE PRESERVATION CALCULATIONS Preliminary ____ Final ✓

EXISTING TREE COUNT ON PROPERTY

ALONG EAST PROPERTY LINE (SOUTH HALF) - 84 - 8" OR GREATER

ALONG NORTH PROPERTY LINE (EAST SIDE) - 30 - 8" OR GREATER

ALONG EAST PROPERTY LINE (NORTH HALF) - 40 - 8" OR GREATER

NORTH OF CLEARING LIMITS 11 TREES PER 2500 SF.
↳ AREA = 2.0 AC ⇒ 87,555 SF → 385 TREES.

TOTAL TREES ON PROPERTY 8" OR GREATER = ~~385~~ 539 TREES

TREES TO BE CLEARED EAST PROPERTY LINE (SOUTH) - 84

NORTH PROPERTY LINE (EAST) - 30

EAST PROPERTY LINE (NORTH) - 40

TOTAL TREES CLEARED = 154

PERCENT OF TREES BEING CLEARED = 154 / ~~385~~ 539 = 29%

TREES REMAINING ON SITE = 71%

REMAINING TREES > THAN REQUIREMENT OF 20%

MC
NDUSTRIA

Burns & McDonnell
SINCE 1898

Stormwater Pollution Prevention Plan

Ameren
MISSOURI

Ameren Missouri

Ameren Belleau Solar Project
Project No. 77051

April 2014

Stormwater Pollution Prevention Plan

prepared for

Ameren Missouri
Ameren Belleau Solar Project
O'Fallon, Missouri

Project No. 77051

April 2014

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

SWPPP CERTIFICATION

Ameren Belleau Solar Project

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

____
Signature of permittee or "duly authorized agent"

____
Printed Name

<table>
<tr><th colspan="3">CONTRACTOR NOTIFICATION</th></tr>
<tr><td colspan="3">“I understand the terms and conditions of this Stormwater Pollution Prevention Plan and the associated Missouri regulations that authorize the discharge of stormwater from construction activities associated with the Project.”</td></tr>
<tr><td>Signature</td><td>For</td><td>Responsible for</td></tr>
<tr><td>(Name)
(Position)
(Signature)
(Date)</td><td>(Company)
(Street / P.O. Box)
(City, State, Zip)
(Phone)</td><td>(Activity)</td></tr>
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(Position)
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(Date)</td><td>(Company)
(Street / P.O. Box)
(City, State, Zip)
(Phone)</td><td>(Activity)</td></tr>
</table>

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1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) requires a National Pollutant Discharge Elimination System (NPDES) General Permit for stormwater discharges from construction activities that disturb one or more acres of land. For the purposes of the NPDES program, construction activities are defined as clearing, excavating, grading, or other land-disturbing activities.

In the State of Missouri, projects that will disturb one or more acres of land must obtain coverage under General Permit MORA00000 (Permit) from the Missouri Department of Natural Resources (MDNR) and develop a Stormwater Pollution Prevention Plan (SWPPP). A copy of the Permit is provided in Appendix A. In accordance with these requirements, Ameren Missouri (Ameren) has obtained Permit coverage via the MDNR ePermitting system (Appendix G) and has developed this SWPPP for the Ameren Belleau Solar Project (Project) in O'Fallon, Missouri. This SWPPP establishes a plan to manage the quality of stormwater runoff from construction activities associated with the Project. Because the Project is located within the limits of the City of O'Fallon, Missouri, this SWPPP will be submitted to the City for approval.

This document is a guide to be used by on-site construction personnel to reduce soil erosion and prevent potential on-site pollutants from leaving the site or entering waters of the State of Missouri. The SWPPP should be modified as necessary throughout the duration of the Project until final stabilization has been achieved. Best management practices (BMPs) should me moved, added, or redesigned as necessary to control erosion and sedimentation to the maximum extent practicable. This SWPPP was written with the assistance of and information from *Protecting Water Quality: A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri and Kansas* (MDNR 2011) and *Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites* (EPA 2007).

1.1 Project Location and Description

The Project will construct a 5.7 megawatt DC (4.5 megawatt AC) solar photovoltaic power plant directly adjacent to Ameren's existing Belleau substation at 1621 Highway 79 in O'Fallon, Missouri (Figure 1-1 on page 1-4). The Project is located at latitude 38° 49' 35"N and longitude 90° 40' 40"W. The Project site is approximately 33.7 acres of which approximately 27.4 acres will be disturbed. Construction is scheduled to begin June 2014 and be completed in December 2014.

1.2 Project Owner and Operator

The Project owner and operator, Ameren, will be the responsible entity for completing the Project. Their address and telephone number are:

Ameren Missouri
1901 Chouteau Avenue
St. Louis, MO 63166
800-552-7583

The individuals listed below in Table 1-1 can be contacted regarding the Project. Additional information will be provided as it becomes available.

Table 1-1: Project Contacts

Name	Title	Area of Responsibility	Phone Number
		Facility Contact	
		Inspection, Operation & Maintenance of BMPs	
		Spill Contact	

1.3 Certifications

Contractors and subcontractors must sign a copy of the Contractor Notification form (located near the front of this document, copy as needed) before initiating land disturbances or providing professional services. By signing it, each contractor and subcontractor signifies that they have read, understand, and will adhere to the SWPPP before conducting construction work that involves soil disturbance. The signed notification confirms that Ameren has notified the contractor or subcontractor that a SWPPP has been prepared for the Project and that the contractor will perform the necessary actions that have been identified to comply with the SWPPP and the Permit. It may be necessary for the contractor/subcontractor to implement additional erosion and sedimentation controls and pollution prevention measures that may not be indicated in this SWPPP to maintain compliance with the Permit.

1.4 Public Notification

A required by the Permit, a public notification sign will be posted at the main entrance to the Project site until the Permit has been terminated. A copy of the sign is provided in Appendix H.

1.5 Final Stabilization and Termination of Permit Coverage

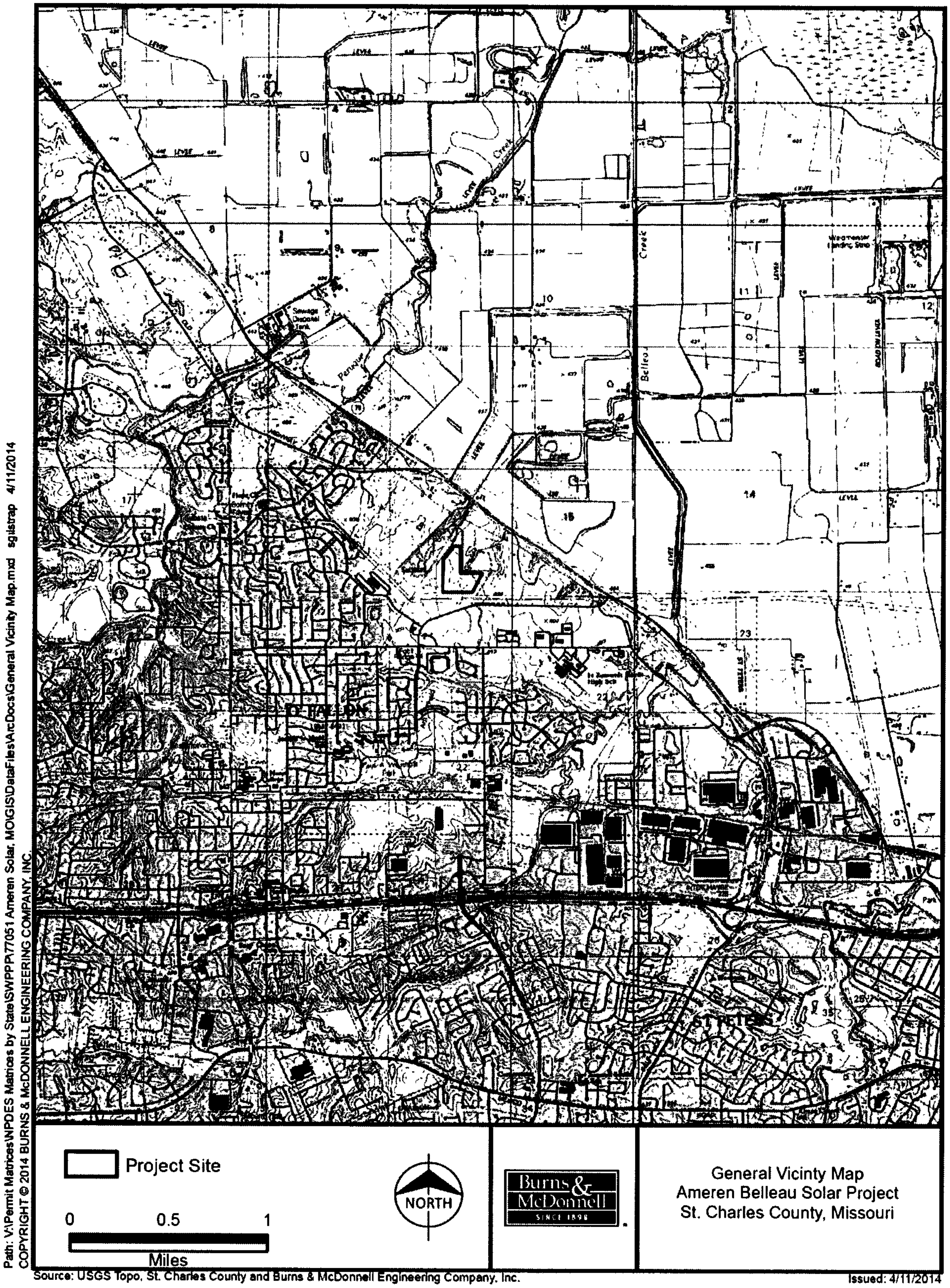
The Project has achieved final stabilization when soil-disturbing activities at the Project site have been completed and perennial vegetation, pavement, buildings, structures, or other permanent ground surfacing materials cover all areas that have been disturbed. For areas that have been vegetated, vegetation cover must be at least 70 percent plant density over 100 percent of the vegetated area. When construction activities authorized under the Permit are complete and the site is finally stabilized, Ameren must submit a Notice of Termination to the MDNR (Appendix I).

1.6 Retention of Records

The SWPPP will be maintained at the appropriate Project construction office from the date of Project initiation to the date of Project completion. Ameren will retain the SWPPP for a minimum period of three years from the date on the Notice of Termination. Records that must be retained include:

- SWPPP and any amendments to the SWPPP
- Results of monitoring and analysis
- Site inspection records required by the Permit

Figure 1-1: General Vicinity Map



2.0 CONSTRUCTION ACTIVITIES AND SITE DESCRIPTION

The following sections include a description of the construction activities that will take place for the Project as well as information regarding the natural resources on and adjacent to the Project site.

2.1 Description of Construction Activities

Construction activities will include tree removal, grading, structure installation, gravel surfacing, and revegetation. The amount of soil exposed during construction at any one time will be minimized, and existing vegetation will be preserved where practical. The time period for disturbed areas to be without cover will be minimized to the maximum extent practicable.

Construction trailers and parking will be located north of the existing Ameren Belleau Substation as shown on the Erosion Control Plan in Appendix B.

2.2 Sequence of Major Construction Activities

The following is a chronological list of the planned sequence of activities and implementation of erosion and sediment controls for the construction of the Project:

1. Install erosion and sediment control measures, including silt fence, filter socks, and inlet and outlet protection
2. Tree removal
3. Complete excavation and grading for sediment basins
4. Grade site
5. Install base rock
6. Install solar panel and electrical wiring
7. Seed and mulch disturbed areas
8. Remove sediment from basins
9. Excavate and construct basin outlets and detention basins
10. Remove temporary BMPs after construction activities are complete and the site is stabilized
11. Submit Notice of Termination to MDNR

2.3 Soils

According to the United States Department of Agriculture, Natural Resources Conservation Service (NRCS) Web Soil Survey of St. Charles County, Missouri, retrieved on April 14, 2014 from http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx, the Project is comprised of two soil series.

- Menfro silt loam (9 to 14 percent slopes, eroded) – This soil series is comprised of well drained, moderately permeable soils that formed in thick loess deposits on upland ridgetops, backslopes, and benches.
- Weller silt loam (2 to 5 percent slopes) – Weller soils are well drained, have slow permeability, and formed in loess on uplands and high stream benches.

The erosion K factor for the on-site soils ranges from 0.43 to 0.49. The erosion K factor, with possible values ranging from 0.02 to 0.69, signifies how susceptible a soil is to sheet and rill erosion by water. The larger the K value the more susceptible the soil is to erosion. The soils on the Project site are moderately susceptible to erosion by water.

2.4 Potential Pollutants

The primary pollutant sources on the Project site will be disturbed soils and subsequent surface water runoff. BMPs will be employed to control erosion and sedimentation and are discussed in further detail in Section 3.0. Other potential pollutant sources include petroleum products needed for construction equipment, paints, solvents, etc. BMPs for product-specific practices are discussed in Sections 4.0 and 5.0.

2.5 Site Maps and Drawings

The General Vicinity Map (Figure 1-1), outlining the Project area, is located on page 1-4. The Erosion Control Plan and BMP details are located in Appendices B and C, respectively.

2.6 Receiving Waters

According to the U.S. Geological Survey topographic map of the Project area, a stream is located just outside the eastern portion of the Project boundary and flows northeast to a levee system associated with Belleau Creek. No wetlands or other jurisdictional waters will be disturbed during Project construction.

2.7 Threatened and Endangered Species

The Project site is currently a grassy field and is located adjacent to an existing substation. No impacts to protected species are expected during Project construction due to the nearby roads and development and lack of suitable habitat. The following species are federally protected in St. Charles County, Missouri according to the U.S. Fish and Wildlife Service.

Table 2-1: Threatened and Endangered Species Listed for St. Charles County

Common Name	Scientific Name	Federal Status
Indiana bat	*Myotis sodalis*	Endangered
Northern long-eared bat	*Myotis septentrionalis*	Proposed as Endangered
Least tern (interior population)	*Sterna antillarum*	Endangered
Pallid sturgeon	*Scaphirhynchus albus*	Endangered
Decurrent false aster	*Boltonia decurrens*	Threatened
Running buffalo clover	*Trifolium stoloniferum*	Endangered

Source: U.S. Fish and Wildlife Service 2013

2.8 Cultural Resources

According to the National Register of Historical Places (NRHP), no historical properties are located on or near the Project site. Additionally, no architectural properties are listed on or nominated for inclusion in the NRHP. Workers must stop work immediately and notify Ameren and the construction office upon discovery of items with potential historical significance, including but not limited to, arrowheads, bones, old bottles or building materials, building foundations, and suspected gravesites.

3.0 BEST MANAGEMENT PRACTICES

The following sections include information regarding the proposed erosion and sediment control measures to be used on the Project site during construction activities until final stabilization is achieved.

3.1 Erosion and Sediment Controls

Soil erosion and sediment controls are used to reduce the amount of soil particles carried from a land area and deposited in receiving waters. Ameren's construction contractors/subcontractors will be responsible for amending the erosion and sediment controls in the SWPPP for their portion(s) of the Project. Based on field conditions at the time of construction, the authorized contractors/subcontractors may adjust the locations and types of BMPs so that erosion and sedimentation are controlled to the maximum extent practicable. However, in no case will modifications to the SWPPP result in less stringent erosion and sedimentation control measures than specified herein. Revisions to the SWPPP will be recorded on the Record of Revisions form (Appendix F).

Several factors should be considered when selecting appropriate erosion and sediment control measures:

- Size of the affected area
- Type of proposed construction activities
- Soil type and texture
- Amount of rock
- Steepness and length of slope
- Amount of vegetative cover
- Proximity to watercourses or wetlands, particularly downslope from construction activities
- Date and intensity of the last major rain event
- Anticipated weather conditions and frozen ground

Applicable soil erosion and sediment control measures will be implemented in accordance with this SWPPP and the Permit prior to commencing field construction activities. Measures will be maintained during and after the construction activity until final stabilization of the soil is achieved. Upon final stabilization of disturbed areas, temporary structural erosion and sediment control measures will be removed.

3.2 Structural Control Practices

Structural control practices divert flows from exposed soils, store water flows, or otherwise limit runoff from exposed areas of a site. Such practices may include silt fence, earth dikes, drainage swales, sediment traps, check dams, subsurface drains, pipe-slope drains, level spreaders, storm drain inlet protection, rock outlet protection (riprap), reinforced soil-retaining systems, gabions, and sediment basins. Some of these practices may be used as both temporary and permanent control measures. Structural control practices should be placed in upland areas to the degree practicable to prevent erosion and reduce sedimentation in lower elevation areas.

3.2.1 Temporary Erosion and Sediment Control Practices

Temporary erosion and sediment control measures will be in place prior to soil-disturbing activities and will be maintained throughout construction. The contractor/subcontractor may need control measures in other locations of the Project as work progresses to keep sediment from leaving the construction site. These measures will be determined in the field. If measures are changed in the field, the SWPPP will be modified accordingly. Temporary erosion controls will be removed after the protected area is finally stabilized. The minimum temporary erosion and sediment control practices that will be used for the Project are discussed in the following sections.

3.2.1.1 Silt Fence

Silt fence will be used to intercept and retain sediment carried by sheet flow from disturbed areas and to prevent sediment-laden runoff from leaving the Project site. Silt fence will be placed perpendicular to the direction of water flow and as close to the contours as possible with the ends extending upslope. Silt fence will also be placed downslope of disturbed areas where sheet or rill erosion would occur and around any soil stockpiles. Silt fence is to be checked and maintained on a regular basis, and sediment buildup must be removed when sediment reaches 50 percent of the height of the barrier. Location and installation details for silt fence are located in Appendix B.

3.2.1.2 Filter Socks

Compost filter socks are a three-dimensional tubular sediment control and stormwater runoff filtration device used for the control of sediment and soluble pollutants (such as phosphorus and petroleum hydrocarbons) on and around construction activities. Filter socks trap sediment and soluble pollutants by filtering runoff water as it passes through the matrix of the compost filter sock and by allowing water to temporarily pond behind the sock, allowing for deposition of suspended solids. Compost filter socks are also used to reduce runoff flow velocities on sloped surfaces and in ditches. Details regarding the location and installation of filter socks are provided in Appendix B.

3.2.1.3 Inlet Protection

Culvert inlets that have the potential of receiving stormwater runoff from the construction site will have a temporary sediment control barrier placed around the culvert opening to prevent sediment from entering the culvert and being deposited off site. Timely inspection and maintenance allows for frequent removal and adequate disposal of accumulated sediment for optimum BMP performance. At the very least, inlets should be cleaned weekly or following a rainfall that generates runoff. It will be up to the contractor/subcontractor to determine which types of inlet protection are most suitable for the culverts. Locations and typical installation details for inlet protection are provided in Appendices B and C, respectively.

3.2.1.4 Sediment Basins

Two sediment basins, Detention Basin #1 and Detention Basin #2, will be installed on the Project site to capture sediment from stormwater runoff and release runoff from the site at a controlled rate. Accumulated sediment must be removed when the basin is 50 percent full. Further details are provided in Appendices B and C.

3.2.1.5 Dust Control

In areas where bare soil is exposed, water or other dust palliatives will be applied to the soil to prevent wind erosion. Stockpiled spoils will be covered with tarps or sprayed with water or tackifier to reduce the potential for wind erosion. Precautions will be taken to not over-water and erode soils. In addition, appropriate speed limits will be established at the Project site to minimize the generation of dust.

3.2.2 Permanent Erosion and Sediment Control Practices

Permanent erosion and sediment control practices are those that will be left in place after construction is finished and the site is stabilized.

3.2.2.1 Detention Basins

After the Project site is stabilized, accumulated sediment will be removed from the two sediment basins, and the basins will be converted to permanent detention basins. Because the Project is located within the limits of the City of O'Fallon, the detention basins were designed in accordance with Section 405.240 – Stormwater Detention Ordinance and the Post-Construction BMP Ordinance. Each detention basin must be inspected by the City during construction to ensure each system is being constructed in accordance with the approved Project plans. Location and installation details are provided in Appendices B and C, respectively.

The basins are designed to capture and treat the runoff from 90 percent of the recorded daily rainfall events according to the calculations shown in Table 3-1.

$WQ_v = (1.14*R_vA)/12$

$R_v = 0.05+0.009(I)$

I = percent impervious

A = drainage area

Table 3-1: Water Quality Volume for Detention Basins #1 and #2

Basin	Drainage Area (acres)	Percent Impervious[1]	R_v	WQ_v (ac-ft)
Detention Basin #1	14.78	85	0.815	1.144
Detention Basin #2	8.95	85	0.815	0.693

1 = Type 5 Base (gravel) has been approximated as 85 percent impervious.

3.2.2.2 Outlet Protection

Riprap will be used at stormwater outlets on the Project site to protect soil from erosion in areas of concentrated flow. The riprap material should be durable to withstand freeze and thaw cycles and should be a mixture of different rock sizes. Additionally, a synthetic filter fabric should be installed before applying the riprap to prevent underlying soil from moving through the riprap. Riprap should be inspected annually and after major storms. Locations and typical installation details for outlet protection are provided in Appendices B and C, respectively.

3.3 Stabilization Practices

Temporary stabilization must be initiated immediately and completed within seven calendar days when soil-disturbing activities have temporarily ceased on any portion of the site and will not resume for more than 14 calendar days. If the slope of an area is greater than 3:1 or greater than three percent and greater than 150 feet in length, then temporary stabilization must be established within seven days of ceasing operation on that portion of the site.

Final stabilization must be initiated immediately and completed within seven calendar days whenever land-disturbing activities have permanently ceased on any portion of the Project. Allowances to the seven-day completion period for temporary and final stabilization may be made for weather and equipment malfunctions. Any allowances used must be documented in the SWPPP.

The portion of the Project site within the fence will be covered with six inches of rock on top of geotextile fabric. The remaining fill/cut slopes and detention basins will be seeded. If vegetation establishment on steeper slopes is not adequate, riprap will be used for permanent slope protection.

3.3.1 Seeding

The contractor/subcontractor will be responsible for labor, materials, tools, equipment, and other related items required for preparing ground, sowing of seeds, fertilizing, mulching and top dressing, and other management practices. It will be the contractor/subcontractor's responsibility to prevent the soil seedbed from being blown, washed, or otherwise removed from the site. The contractor/subcontractor will make repairs, including replacement of lost topsoil and mulch, to the seedbed preparation site in the event of heavy rain, wind, or other natural events that cause damage.

3.3.2 Mulching

Mulching will be used in conjunction with seeding practices to enhance success by providing erosion protection prior to the onset of vegetative growth. Mulching should be completed within 24 hours following the seeding operation.

3.3.3 Erosion Control Blankets

An erosion control blanket consists of organic or synthetic mulch that is held together by polypropylene, natural fiber, or similar netting material. It may be used on slopes and in concentrated flow channels to minimize erosion by protecting the soil from rainfall impact, overland water flow, concentrated runoff, and wind during vegetation establishment. For this Project, erosion control blankets will be used on 3:1 or greater slopes. Staples, pins, or stakes should be used to prevent movement or displacement of the blanket. Erosion control blankets should be UV-degradable over time and should be used with caution in certain areas as the blanket netting may pose a threat to certain wildlife species if they become entangled in the netting matrix. Typical installation and maintenance details for erosion control blankets are provided in Appendix C.

3.4 Maintenance and Inspections

Erosion and sediment control devices must be inspected by a qualified person at a minimum of once every seven days. During each inspection, the construction inspector will inspect all BMPs and other pollution control measures for proper installation, operation, and maintenance. Additionally, all stormwater outfalls must be inspected for evidence of erosion or sediment deposition. Inspection findings will be recorded on the Inspection and Maintenance Report form located in Appendix D. This sheet should be copied and used as necessary. Ineffective erosion control measures will be repaired or replaced within seven calendar days of identification or as soon as weather conditions permit. If weather conditions prevent BMP corrections within seven calendar days, the reasons for the delay must be documented with pictures and a narrative explaining why the work could not be accomplished within the seven-day time period. The documentation must be filed with the regular inspection reports.

If rainfall causes stormwater runoff to occur on the Project site, BMPs must be inspected within 48 hours if the rain event ceases during a normal work week and within 72 hours if the rain event ceases during a non-work day. If the inspector is not on the Project site full-time, he or she will be notified by the site superintendent or another full-time site worker when runoff occurs.

Because the Project is located within the limits of the City of O'Fallon, Missouri, the Project is also required to complete and submit a Land Disturbance Checklist to the City each week until final stabilization is achieved. The Checklist is included in Appendix D and should be copied as needed.

If inspection results indicate a need to modify the SWPPP, then the plan will be revised and implemented, as appropriate, within seven calendar days following the inspection. All modifications will be noted on the Record of Revisions form located in Appendix F. Incidents of Permit non-compliance will be identified in the Inspection and Maintenance Report in Appendix D.

Following the completion of construction and stabilization activities, the construction inspector will conduct inspections at least once per month to monitor vegetative growth until final stabilization is achieved. If vegetative cover is not adequate, then special steps will be implemented such as overseeding, sodding, or the use of erosion control blankets.

4.0 GOOD HOUSEKEEPING

The following practices will be followed by Project contractors/subcontractors to protect stormwater and surrounding surface waters from contamination.

4.1 Material Handling

Construction materials that pose a potential contamination threat (e.g. petroleum products, solvents) will be managed to minimize exposure to stormwater. Materials will be kept in secure containers and be properly labeled. Copies of the Material Safety Data Sheets (MSDS) will be maintained on site.

4.2 Solid and Liquid Waste Disposal

Solid and liquid wastes, including sediment, asphalt, concrete millings, floating debris, paper, plastic, fabric, and construction and demolition debris) will be disposed of properly and in accordance with applicable federal, state, and local disposal requirements. Waste material will be collected and stored in a secure container and removed from the Project site. Waste containers will be inspected regularly.

4.3 Hazardous Material

Hazardous materials will be used, stored, transported, and disposed of in the manner specified by the manufacturer and by local, state, and federal regulations, including the Missouri Hazardous Waste Laws and Regulations. Site personnel must be made aware of this requirement. Spill response procedures are discussed in Section 5.0.

4.4 Sanitary Waste

Contractors and subcontractors must comply with federal, state, and local sanitary sewer, portable toilet, or septic system regulations. Each contractor and subcontractor must provide sanitary facilities for their crew at the Project site throughout construction. The sanitary facilities must be serviced regularly, and portable toilets should not be placed near drainage courses or in low areas.

4.5 Non-Stormwater Discharges

The Permit authorizes non-stormwater discharges from the following activities:

- Dewatering activities if no contaminants other than sediment are present in the discharge, and the discharge is treated as specified in Requirements, Section C.3.m of the Permit
- Water hydrant and potable water line flushings
- Water only (i.e. without detergents or additives) rinsing of streets and buildings
- Water used to establish vegetation

4.6 Vehicle Washing

Vehicle washing will not be conducted on sites of active construction. If vehicle washing is required, then a designated area will be selected where runoff can be contained and properly disposed. If concrete trucks are necessary, they will not be allowed to wash out or discharge surplus concrete or drum wash to waters of the State of Missouri.

4.7 Water Source

Water used to establish and maintain grass, control dust, or for other construction purposes must originate from a public water supply or private well approved by the State of Missouri or local health department. Potable water must adhere to local and state regulations for water standards.

5.0 SPILL PREVENTION AND CONTROL PLAN

This section comprises the Spill Prevention and Control Plan (SPCP), which describes measures to prevent, control, and minimize impacts from a spill of a hazardous, toxic, or petroleum substance during construction of the proposed Project. This plan describes the transport, storage, and disposal procedures for the potentially hazardous materials to be used and outlines the procedures to be followed in the event of a spill of a contaminating or toxic substance.

As per 40 CFR 112, a Spill Prevention Control and Countermeasures (SPCC) Plan must be prepared if the Project site will have 1,320 gallons of aboveground storage capacity (or 42,000 gallons in underground storage not regulated by UST rules) or more in 55-gallon-sized, or larger, containers. This would include temporary tanks or fueling trucks used to "store" petroleum on site. The truck would be subject to the SPCC Plan rules when parked on the construction site and used for "storage."

If a contractor's/subcontractor's cumulative petroleum capacity exceeds 1,320 gallons, then the contractor/subcontractor must maintain a certified SPCC Plan in accordance with 40 CFR 112.

5.1 Material Management Practices

The proper use and storage of materials and equipment along with the use of common sense greatly reduce the potential for contaminating stormwater runoff. The following list of good housekeeping practices should be implemented during the Project:

- Hazardous materials, chemicals, fuels, and oils should not be stored within 100 feet of a stream bank, wetland, water supply well, spring, or other waterbody
- Fueling of construction equipment should not be conducted within 100 feet of a stream bank, wetland, water supply well, spring, or other waterbody
- Every effort should be made to store the minimum amount of hazardous or toxic materials on site
- On-site materials should be stored in a neat, orderly manner in appropriate containers and, if possible, under a roof or other enclosure
- Products should be kept in original containers with the original manufacturer's label
- Substances should not be mixed with one another unless recommended by the manufacturer
- Whenever possible, all of a product should be used before disposing of the container
- If surplus product must be disposed, then the manufacturer's or local- and state-recommended methods for proper disposal should be followed

5.1.1 Non-Petroleum Products

Due to the chemical makeup of specific products, certain handling and storage procedures are required to promote the safety of handlers and prevent the possibility of pollution. Care should be taken to follow directions and warnings for products used on the Project site. Pertinent information can be found on the MSDS for each product. The MSDS will be kept on site.

5.1.2 Petroleum Products

On-site vehicles will be monitored for leaks and receive regular maintenance to reduce the chance of leakage. Inspections for leaks or spillage should occur during the once-per-week inspection of BMPs. Petroleum products will be stored in tightly sealed, clearly labeled containers. Preferably, the containers will be stored in a covered truck or trailer that provides secondary containment.

Bulk storage tanks having a capacity of greater than 55 gallons will be provided with secondary containment. Containment can be provided by a temporary earthen berm or other means. After each rainfall event, the site inspector must inspect the contents of the secondary containment area for excess water. If no sheen is visible, then the collected water can be pumped to the ground in a manner that does not cause scouring. If sheen is present, then the water must be treated prior to discharging it. Otherwise, the contaminated water must be transported and disposed of off site in accordance with local, state, and federal requirements.

Bulk fuel or lubricating oil dispensers should not have a self-locking mechanism that allows for unsupervised fueling. Fueling operations should be observed to immediately detect and contain spills.

No waste oil or other petroleum-based products will be disposed on site (e.g. buried, poured), but must be taken off site for proper disposal.

5.2 Spill Control and Cleanup

In addition to the material management practices discussed previously, the following spill control and cleanup practices will be used to prevent storm water pollution in the event of a spill:

- On-site personnel will be made aware of cleanup procedures and the location of spill equipment
- Spills will be contained and cleaned up immediately after discovery
- Manufacturer methods for spill cleanup of a material will be followed as described on the material's MSDS
- Materials and equipment needed for cleanup procedures will be kept readily available on site, either at an equipment storage area or on contractors'/subcontractors' trucks; equipment to be

kept on the site will include but not be limited to brooms, dust pans, shovels, granular absorbents, sand, sawdust, absorbent pads and booms, plastic and metal trash containers, gloves, and goggles
- Toxic, hazardous, or petroleum product spills required to be reported by regulation will be documented to the appropriate federal, state, and local agencies
- Spills will be documented, and a record of spills will be kept with this SWPPP

The federal reportable spill quantity for petroleum products is defined in 40 CFR 110 as an oil spill that

- Violates applicable water quality standards
- Causes a film or sheen upon or discoloration of the water surface or adjoining shoreline
- Causes a sludge or emulsion to be deposited beneath the surface of the water or adjoining shorelines

In the State of Missouri, a reportable spill of petroleum is the discharge into the environment of more than 50 gallons. The federal reportable spill quantities for hazardous materials are listed in 40 CFR Part 302.4, *List of Hazardous Substances and Reportable Quantities.* A procedure for determining a reportable spill is included in Appendix E, along with a copy of the Spill Report form to be completed as a result of a reportable spill. The reportable spill quantities for hazardous materials in the State of Missouri follow the federal reportable quantities listed in 40 CFR Part 302.4.

If a spill occurs on site, the contractor's/subcontractor's superintendent will, within 15 minutes of discovering the spill, contact the Spill Contact listed in Table 1-1. This individual will contact the following authorities as necessary:

Federal

National Response Center: 800-424-8802 or 202-267-2675
EPA (Region 7) 24-hour Emergency Response Center: 913-281-0991

State

Environmental Emergency Response (24 hours): 573-634-2436

If a reportable release occurs, then a modification to the SWPPP must be made within 14 days. The modification must include the following:

- Date of the release
- Description of the release

- Explanation of why the spill occurred
- Description of procedures to prevent future spills and/or releases
- Description of response procedures if a second spill or release occurs within 14 days of the first release

These modifications to the SWPPP must be documented on the Record of Revisions form in Appendix F.

APPENDIX A – GENERAL PERMIT

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

MISSOURI STATE OPERATING PERMIT

GENERAL OPERATING PERMIT

In compliance with the Missouri Clean Water Law, (Chapter 644 R.S. Mo. as amended, hereinafter, the Law), and the Federal Water Pollution Control Act (Public Law 92-500, 92nd Congress) as amended,

Permit No.	<MORA00000>
Owner:	< name >
Address:	< address >
Continuing Authority:	< name, or Same as above >
Address:	< address, or Same as above >
Facility Name:	< name >
Facility Address:	< physical address >
Legal Description:	¼, ¼, ¼, Sec. xx, TxxN, RxxW, < county > County
UTM Coordinates:	
Receiving Stream:	< receiving stream > < (U, C, P, L1, L2, L3) >
First Classified Stream and ID:	< 1st classified stream > <(U, C, P, etc.)> <(ID number)>
USGS Basin & Sub-watershed No.:	< (USGS HUC12 #) >

is authorized to discharge from the facility described herein, in accordance with the effluent limitations and monitoring requirements as set forth herein:

FACILITY DESCRIPTION

All Outfalls

Construction or land disturbance activity (e.g. clearing, grubbing, excavating, grading and other activities that result in the destruction of the root zone and/or land disturbance activity that is reasonably certain to cause pollution to waters of the state).

This permit authorizes only wastewater, including storm water, discharges under the Missouri Clean Water Law and the National Pollutant Discharge Elimination System, it does not apply to other regulated areas. This permit may be appealed in accordance with RSMo Section 644.051.6 and 621.250, 10 CSR 20-6.020, and 10 CSR 20-1.020.

February 8, 2012	Sara Parker Pauley
Effective Date	Sara Parker Pauley, Director, Department of Natural Resources
February 7, 2017	John Madras
Expiration Date	John Madras, Director, Water Protection Program

APPLICABILITY

1. This general permit authorizes the discharge of stormwater and certain non-stormwater discharges from land disturbance sites that disturb one or more acres or disturb less than one acre when part of a larger common plan of development or sale that will disturb a cumulative total of one or more acres over the life of the project. This general permit also authorizes the discharge of stormwater and certain non-stormwater discharges from smaller projects where the Missouri Department of Natural Resources (Department) has exercised its discretion to require a permit [10 CSR 20-6.200 (1)(B)].

   A Missouri State Operating Permit that specifically identifies the project must be issued before any site vegetation is removed or the site disturbed.

   Any site owner/operator subject to these requirements for stormwater discharges and who disturbs land prior to permit issuance from the Department is in violation of both State and Federal Laws.

   The legal owner of the property or the holder of an easement on the property, and operator on which the site is located are responsible for compliance with this permit.

2. This permit authorizes non-stormwater discharges from the following activities provided that these discharges are addressed in the permittee's specific Stormwater Pollution Prevention Plan (SWPPP) required by this general permit:
   a. De-watering activities if there are no contaminants other than sediment present in the discharge, and the discharge is treated as specified in Requirements, Section C.3.m. of this permit;
   b. Flushing water hydrants and potable water lines;
   c. Water only (i.e., without detergents or additives) rinsing of streets and buildings; and
   d. Site watering to establish vegetation.

3. This general permit does not authorize the placement of fill materials in flood plains, the obstruction of stream flow, directing stormwaters across private property not owned or operated by the permittee, or changing the channel of a defined drainage course. This general permit addresses only the quality of the stormwater runoff and the minimization of off-site migration of sediments and other water contaminants.

4. This general permit does not authorize any discharge to waters of the state of sewage or pollutants including but not limited to:
   a. Any hazardous material, oil, lubricant, solid waste or other non-naturally occurring substance from the site, including fuels, oils, or other pollutants used in vehicle and equipment operation and maintenance;
   b. Soaps or solvents used in vehicle and equipment washing;
   c. Hazardous substances or petroleum products from an on-site spill or handling and disposal practices,
   d. Wash and/or rinse waters from concrete mixing equipment including ready mix concrete trucks, unless managed by an appropriate control. Any such pollutants must be adequately treated and addressed in the SWPPP, and cannot be discharged to waters of the state;
   e. Wastewater from washout and cleanout of stucco, paint, form release oils, curing compounds and other construction materials;
   f. Wastewater generated from air pollution control equipment or the containment of scrubber water in lined ponds;
   g. Domestic wastewaters, including gray waters; or
   h. Industrial stormwater runoff.

A. APPLICABILITY (continued)

5. The Department reserves the right to revoke or deny coverage under this general permit to applicants for stormwater discharges from land disturbance activities at sites that have contaminated soils that will be disturbed by the land disturbance activity or where such materials are brought to the site to use as fill or borrow. A site-specific permit may be required to cover such activities.

6. Discharges shall not cause violations of the Water Quality Standards 10 CSR 20-7.0.031(3). If at any time the Department determines that the quality of waters of the state may be better protected by requiring the owner/operator of the permitted site to apply for a site-specific permit, the Department may require any person to obtain a site-specific operating permit [10 CSR 20-6.010(13)(C)].

   The Department may require the permittee to apply for and obtain a site-specific or different general permit if:
   a. The permittee is not in compliance with the conditions of this general permit;
   b. The discharge no longer qualifies for this general permit due to changed site conditions and/or regulations; or
   c. Information becomes available that indicates water quality standards have been or may be violated.

   The permittee will be notified in writing of the requirement to apply for a site-specific permit or a different general permit. When a site-specific permit or different general permit is issued to the authorized permittee, the applicability of this general permit to the permittee is automatically terminated upon the effective date of the site specific or different general permit.

7. Any owner/operator authorized by a general permit may request to be excluded from the coverage of the general permit and apply for a site-specific permit [10 CSR 20-6.010(13)(D)].

8. This permit does not authorize land disturbance activity in jurisdictional waters of the United States as defined by the Army Corps of Engineers, unless the permittee has obtained the required 404/401 permit. Land disturbance activities may not begin in the affected portions of the site until the required 404/401 permits have been obtained.

9. This permit does not supersede compliance with the Historic Preservation Act or the Endangered Species Act.

10. This permit does not supersede any requirement for obtaining project approval under an established local authority.

11. This permit is not transferable to other owners or operators.

B. EXEMPTIONS FROM PERMIT REQUIREMENTS

1. Facilities that discharge all stormwater runoff directly to a combined sewer system are exempt from stormwater permit requirements.

2. Land disturbance activity as described in [10 CSR 20-6.200(1)(B)] and [10 CSR 20-6.010(1)(B)] where water quality standards are not exceeded.

3. Linear, strip, or ribbon construction (as described in [10 CSR 20-6.200(1)(B)8]) where water quality standards are not exceeded.

4. Sites that disturb less than one acre of total land area as described in [10 CSR20-6.200 (1)(B)7], that are not part of a common plan or sale and that do not cause any violations of water quality standards, and are not otherwise designated by the Department as requiring a permit.

5. Agricultural stormwater discharges and irrigation return flows as described in [10CSR 20-6.200 (1)(B)6].

C. REQUIREMENTS

These requirements do not supersede nor remove any requirement to comply with county or other local ordinances [10 CSR20-6.010(14)(D)]:

1. This permit is to ensure the design, the installation and the maintenance of effective erosion controls and sediment controls to minimize the discharge of pollutants. At minimum, such controls must be designed, installed and maintained to:
   a. Control stormwater volume and velocity within the site to minimize soil erosion;
   b. Control stormwater discharges, including both peak flow rates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion;
   c. Minimize the amount of soil exposed during construction activity;
   d. Minimize the disturbance of steep slopes;
   e. Minimize sediment discharges from the site. The design, installation and maintenance of erosion and sediment controls must address factors such as the amount, frequency, intensity and duration of precipitation, the nature of resulting stormwater runoff, and soil characteristics, including the range of soil particle size expected to be present on the site.;
   f. Provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration, unless infeasible; and
   g. Minimize soil compaction and, unless infeasible, preserve topsoil.

2. The primary requirement of this permit is the development and implementation of a SWPPP which incorporates site specific practices to best minimize the soil exposure, soil erosion, and the discharge of pollutants. The permittee shall fully implement the provisions of the SWPPP required under this part as a condition of this general permit throughout the term of the land disturbance project. **The SWPPP must be developed prior to issuance of the permit and must be specific to the land disturbance activities at the site.** A permit must be issued before any disturbance of root zone of the existing vegetation or other land disturbance activities may begin. A copy of the SWPPP must be available on-site when land disturbance operations are in progress, or other operational activities that may affect the maintenance or integrity of the Best Management Practices (BMP) structures and made available made available as specified under Section F. Records of this permit.

.   REQUIREMENTS (continued)

The SWPPP must:
a. List and describe all outfalls;
b. Incorporate required practices identified below;
c. Incorporate erosion control practices specific to site conditions;
d. Provide for maintenance and adherence to the plan;
e. Discuss whether or not a 404/401 Permit is required for the project; and
f. Name the person responsible for inspection, operation and maintenance of BMPs.

The purpose of the SWPPP is to ensure; the design, implementation, management and maintenance of BMPs in order to prevent sediment and other pollutants in stormwater discharges associated with the land disturbance activities; compliance with the Missouri Water Quality Standards; and compliance with the terms and conditions of this general permit.

The permittee shall select, install, use, operate and maintain appropriate BMPs for the permitted site. The following manuals are acceptable resources for the selection of appropriate BMPs.
Developing Your Stormwater Pollution Prevention Plan: A Guide for Construction Sites, (Document number EPA 833-R-06-004) published by the United States Environmental Protection Agency (USEPA) in May 2007. This manual as well as other information, including examples of construction SWPPPs, is available at the USEPA internet site at http://cfpub1.epa.gov/npdes/stormwater/swppp.cfm; and

The latest version of *Protecting Water Quality: A field guide to erosion, sediment and stormwater best management practices for development sites in Missouri,* published by the Missouri Department of Natural Resources. This manual is available on the Department's internet site at: http://www.dnr.mo.gov/env/wpp/wpcp-guide.htm.

The permittee is not limited to the use of these guidance manuals. Other guidance publications may be used to select appropriate BMPs. However, all BMPs should be described and justified in the SWPPP.

3. SWPPP Requirements: The following information and practices shall be provided for in the SWPPP:
   a. Nature of the Construction Activity: The SWPPP briefly must describe the nature of the construction activity, including:
      1) The function of the project (e.g., low density residential, shopping mall, highway, etc.);
      2) The intended sequence and timing of activities that disturb the soils at the site;
      3) Estimates of the total area expected to be disturbed by excavation, grading, or other construction activities including off-site borrow and fill areas; and
      4) A general map (e.g., United States Geological Survey quadrangle map, a portion of a city of county map, or other map) with enough detail to identify the location of the construction site and waters of the United States within one mile of the site.

REQUIREMENTS (continued)

b. Site Map: The SWPPP must contain a legible site map showing the site boundaries and outfalls and identifying:
   1) Direction(s) of stormwater flow and approximate slopes anticipated after grading activities;
   2) Areas of soil disturbance and areas that will not be disturbed (or a statement that all areas of the site will be disturbed unless otherwise noted);
   3) Location of major structural and non-structural BMPs identified in the SWPPP;
   4) Locations where stabilization practices are expected to occur;
   5) Locations of off-site material, waste, borrow or equipment storage areas;
   6) Locations of all waters of the United States (including wetlands);
   7) Locations where stormwater discharges to a surface water; and
   8) Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.

c. Site Description: In order to identify the site, the SWPPP shall include facility and outfall information. The SWPPP shall have sufficient information to be of practical use to contractors and site construction workers to guide the installation and maintenance of BMPs.

d. Effluent Limits: The permittee must select control measurements (e.g., BMPs, controls, practices, etc.) to meet effluent limits found in Section E.1. of this permit. All control measures must be properly selected, installed and maintained in accordance with any relevant manufacturer specifications and good engineering practices. The permittee must implement the control measures from commencement of the construction activity until final stabilization is complete unless the exception noted in Section C.3.i. of this permit applies.

e. Selection of Temporary and Permanent Non-Structural BMPs: The permittee shall select appropriate non-structural BMPs for use at the site and list them in the SWPPP. The SWPPP shall require existing vegetation to be preserved where practical. For surface waters located on or immediately adjacent to the site, the permittee must provide at minimum a 25-foot buffer of undisturbed natural vegetation between the disturbed portions of the site and the surface water unless infeasible or where there is a more stringent local requirement. The time period for disturbed areas to be without vegetative cover is to be minimized to the maximum extent practicable.

   Examples of non-structural BMPs which the permittee should consider specifying in the SWPPP include preservation of trees and mature vegetation, protection of existing vegetation for use as buffer strips, mulching, sodding, temporary seeding, final seeding, geotextiles, stabilization of disturbed areas, preserving existing stream channels as overflow areas when channel straightening or shortening is allowed, soil stabilizing emulsions and tackifiers, mulch tackifiers, stabilized site entrances/exits and other appropriate BMPs.

f. Selection of Temporary and Permanent Structural BMPs: The permittee shall select appropriate structural BMPs for use at the site and list them in the SWPPP. Examples of structural BMPs that the permittee should consider specifying in the SWPPP include diverting flows from undisturbed areas away from disturbed areas, silt (filter fabric and/or straw bale) fences, earthen diversion dikes, drainage swales, sediment traps, rock check dams, subsurface drains (to gather or transport water for surface discharge elsewhere), pipe slope drains (to carry concentrated flow down a slope face), level spreaders (to distribute concentrated flow into sheet flow), storm drain inlet protection and outlet protection, reinforced soil retaining systems, gabions, temporary or permanent sediment basins and other appropriate BMPs.

C. REQUIREMENTS (continued)

g. Description of BMPs: The SWPPP shall include a description of both structural and non-structural BMPs that will be used at the site.

The SWPPP shall provide the following general information for each BMP which will be used one or more times at the site:
1) Physical description of the BMP;
2) Site and physical conditions that must be met for effective use of the BMP;
3) BMP installation/construction procedures, including typical drawings; and
4) Operation and maintenance procedures for the BMP.

The SWPPP shall provide the following information for each specific instance where a BMP is to be installed:
1) Whether the BMP is temporary or permanent;
2) Where, in relation to other site features, the BMP is to be located;
3) When the BMP will be installed in relation to each phase of the land disturbance procedures to complete the project; and
4) Site conditions that must be met before removal of the BMP if the BMP is not a permanent BMP.

h. Disturbed Areas: Slopes for disturbed areas must be defined in the SWPPP. A site map or maps defining the sloped areas for all phases of the project must be included in the SWPPP. Stabilization must be initiated immediately and completed within seven (7) calendar days where soil disturbing activities have temporarily ceased on any portion of the site and will not resume for a period exceeding fourteen (14) calendar days the permittee shall construct BMPs to establish interim stabilization. Interim stabilization shall consist of well established and maintained BMPs that are reasonably certain to protect waters of the state from sediment pollution over an extended period of time. This may require adding more BMPs to an area than is normally used during daily operations. These BMPs may include a combination of sediment basins, check dams, sediment fences and mulch. The types of BMPs used must be suited to the area disturbed, taking into account the number of acres exposed and the steepness of the slopes. If the slope of the area is greater than 3:1 (three feet horizontal to one foot vertical) or if the slope is greater than 3% and greater than 150 feet in length, then the permittee shall establish interim stabilization within seven days of ceasing operations on that part of the site. Final stabilization of disturbed areas must be initiated immediately and completed within seven (7) calendar days whenever any clearing, grading, excavating or other earth disturbing activities have permanently ceased on any portion of the site. Allowances to the seven (7) day completion period for temporary and final stabilization may be made due to weather and equipment malfunctions. The use of allowances shall be documented in the SWPPP.

i. Installation: The permittee shall ensure the BMPs are properly installed at the locations and relative times specified in the SWPPP. Peripheral or border BMPs to control runoff from disturbed areas shall be installed or marked for preservation before general site clearing is started. Note that this requirement does not apply to earth disturbances related to initial site clearing and establishing entry, exit and access of the site, which may require that stormwater controls be installed immediately after the earth disturbance. Stormwater discharges from disturbed areas which leave the site shall pass through an appropriate impediment to sediment movement such as a sedimentation basin, sediment traps and silt fences prior to leaving the land disturbance site. A drainage course change shall be clearly marked on a site map and described in the SWPPP. The location of all BMPs must be indicated on a site map, included in the SWPPP.

C. REQUIREMENTS (continued)

j. Sedimentation Basins: The SWPPP shall include a sedimentation basin for each drainage area with ten or more acres disturbed at one time. The sedimentation basin shall be sized to contain a volume of at least 3,600 cubic feet per each disturbed acre draining thereto. Accumulated sediment shall be removed from the basin when basin is 50% full. When discharging from basins and impoundments, utilize outlet structures that withdraw water from the surface unless infeasible. Discharges from the basin shall not cause scouring of the banks or bottom of the receiving stream. The SWPPP shall require the basin be maintained until final stabilization of the disturbed area served by the basin.

Where use of a sediment basin is impractical, the SWPPP shall evaluate and specify other similarly effective BMPs to be employed to control erosion and sediment delivery. These similarly effective BMPs shall be selected from appropriate BMP guidance documents authorized by this permit. The BMPs must provide equivalent water quality protection to achieve compliance with this permit. The SWPPP shall require both temporary and permanent sedimentation basins to have a stabilized spillway to minimize the potential for erosion of the spillway or basin embankment.

k. Pollution Prevention Measures: The SWPPP shall include BMPs for pollution prevention measures. At minimum such measures must be designed, installed, implemented and maintained to:
1) Minimize the discharge of pollutants from equipment and vehicle washing, wheel wash water, and other wash waters. Wash waters must be treated in a sediment basin or alternative control that provides equivalent or better treatment prior to discharge;
2) Minimize the exposure of building materials, building products, construction wastes, trash, landscape materials, fertilizers, pesticides, herbicides, detergents, sanitary waste, and other materials present on the site to precipitation and to stormwater; and
3) Minimize the discharge of pollutants from spills and leaks and implement chemical spill and leak prevention and response procedures. Included but not limited to the installation of containment berms and use of drip pans at petroleum product and liquid storage tanks and containers.

l. Roadways: Where applicable, upon installation of or connection to roadways, all efforts should be made to prevent the deposition of earth and sediment onto roadways through the use of proper BMPs. Stormwater inlets susceptible to receiving sediment from the permitted land disturbance site shall have curb inlet protection. Where stormwater will flow off the end of where a roadway terminates, a sediment catching BMP such as gravel berm or silt fence shall be provided. Roadways and curb inlets shall be cleaned weekly or following a rainfall that generates a run-off. Where practicable, construction entrance BMP controls shall be used to prevent sediment trackout.

m. Dewatering: Discharges from dewatering activities, including discharges from dewatering of trenches and excavations, are prohibited unless managed by appropriate controls. The SWPPP shall include a description of any anticipated dewatering methods including the anticipated volume of water to be discharged and the anticipated maximum flow discharged from these dewatering activities expressed in gallons per minute. Maximum flow may be stated in the SWPPP as an estimate based on the type and capacity of equipment being used for dewatering. The SWPPP shall call for specific BMPs designed to treat water pumped from trenches and excavations and in no case shall this water be pumped off-site without being treated by the specified BMPs. When discharging from basins and impoundments utilize outlet structures that withdraw water from the surface, unless infeasible.

C. REQUIREMENTS (continued)

4. Good housekeeping practices shall be maintained at all times to keep waste from entering waters of the state. Solid and hazardous waste management include providing trash containers and regular site clean up for proper disposal of solid waste such as scrap building material, product/material shipping waste, food containers and cups, and providing containers and proper disposal of waste paints, solvents and cleaning compounds. The provision of portable toilets for proper disposal of sanitary sewage and the storage of construction materials should be kept away from drainage courses and low areas.

5. All fueling facilities present shall at all times adhere to applicable federal and state regulations concerning underground storage, above ground storage and dispensers.

6. Hazardous wastes that are transported, stored, or used for maintenance, cleaning, or repair shall be managed according to the provisions of the Missouri Hazardous Waste Laws and Regulations.

7. All paint, solvents, petroleum products, petroleum waste products and storage containers such as drums, cans, or cartons shall be stored according to BMPs. The materials exposed to precipitation shall be stored in watertight, structurally sound, closed containers. All containers shall be inspected for leaks or spillage during the once per week inspection of BMPs.

8. Amending/Updating the SWPPP: The permittee shall amend and update the SWPPP as appropriate during the term of the land disturbance activity. The permittee shall amend the SWPPP at a minimum whenever the:
   a. Design, operation, or maintenance of BMPs is changed;
   b. Design of the construction project is changed that could significantly affect the quality of the stormwater discharges;
   c. Permittee's inspections indicate deficiencies in the SWPPP or any BMP;
   d. Department notifies the permittee in writing of deficiencies in the SWPPP;
   e. SWPPP is determined to be ineffective in minimizing or controlling erosion and sedimentation (e.g., there is visual evidence of excessive site erosion or excessive sediment deposits in streams or lakes);
   f. Settleable Solids from a stormwater outfall exceed 2.5 ml/L; and
   g. Department determines violations of water quality standards may occur or have occurred.

9. An individual shall be designated by the permittee as responsible for environmental matters. The individual responsible for environmental matters shall have a thorough and demonstrable knowledge of the site's SWPPP and sediment and erosion control practices in general. The individual responsible for environmental matters or a designated inspector knowledgeable in erosion, sediment and stormwater control principles shall inspect all structures that function to prevent pollution of waters of the state. These inspections shall be conducted in accordance with C.10 of these requirements.

C. REQUIREMENTS (continued

10. Site Inspections Reports: The permittee (or a representative of the permittee) shall conduct regularly scheduled inspections at least once per seven calendar days. These inspections shall be conducted by a qualified person, one who is responsible for environmental matters at the site, or a person trained by and directly supervised by the person responsible for environmental matters at the site. For disturbed areas that have not been finally stabilized, all installed BMPs and other pollution control measures shall be inspected for proper installation, operation and maintenance. All stormwater outfalls shall be inspected for evidence of erosion or sediment deposition. When practicable the receiving stream shall also be inspected for 50 feet downstream of the outfall. Any structural or maintenance problems shall be noted in an inspection report and corrected within seven calendar days of the inspection. If a rainfall causes stormwater runoff to occur on-site, the BMPs must be inspected within a reasonable time period after the rainfall event has ceased. These inspections must occur within 48 hours after the rain event has ceased during a normal work day and within 72 hours if the rain event ceases during a non-work day such as a weekend or holiday.

    The SWPPP must explain how the person responsible for erosion control will be notified when stormwater runoff occurs. If weather conditions prevent correction of BMPs within 7 calendar days, the reasons for the delay must be documented (including pictures) and there must be a narrative explaining why the work cannot be accomplished within the 7 day time period. The documentation must be filed with the regular inspection reports. The permittee shall correct the problem as soon as weather conditions allow. Areas on-site that have been finally stabilized must be inspected at least once per month.

    A log of each inspection and copy of the inspection report shall be kept on-site. The inspection report shall be signed by the permittee or by the person performing the inspection if duly authorized to do so. The inspection report is to include the following minimum information:
    a. Inspector's name;
    b. Date of inspection;
    c. Observations relative to the effectiveness of the BMPs;
    d. Actions taken or necessary to correct the observed problem; and
    e. Listing of areas where land disturbance operations have permanently or temporarily stopped.

11. Proper Operation and Maintenance: The permittee shall at all times maintain all pollution control measures and systems in good order to achieve compliance with the terms of this general permit.

12. Notification to All Contractors: The permittee shall be responsible for notifying each contractor or entity (including utility crews and city employees or their agents) who will perform work at the site of the existence of the SWPPP and what action or precautions shall be taken while on-site to minimize the potential for erosion and the potential for damaging any BMP. The permittee is responsible for any damage a subcontractor may do to established BMPs and any subsequent water quality violation resulting from the damage.

13. Public Notification: The permittee shall post a copy of the public notification sign described by the Department at the main entrance to the site. The public notification sign must be visible from the public road that provides access to the site's main entrance. An alternate location is acceptable provided the public can see it and it is noted in the SWPPP. The public notification sign must remain posted at the site until the permit has been terminated.

D. OTHER DISCHARGES

1. Hazardous Substance and Oil Spill Reporting: Refer to Section B, #14 of Part I of the Standard Conditions that accompany this permit.

2. Removed substances: Refer to Section B, #6 of Part I of the Standard Conditions that accompany this permit.

3. Change in discharge: In the event soil contamination or hazardous substances are discovered at the site during land disturbance activities, the permittee shall notify the Department's regional office by telephone as soon as practicable but no later than 24 hours after discovery. The permittee must also notify the Department's regional office in writing no later than 14 calendar days after discovery.

E. SAMPLING REQUIREMENTS AND EFFLUENT LIMITATIONS

1. The effluent limitation for Settleable Solids from a stormwater outfall discharging shall not exceed 2.5 ml/L per Standard Method 2540 F, except immediately following the local 2-year, 24-hour storm event. The Settleable Solids limit is not enforceable during or greater than the local 2-year, 24-hour storm event.

2. The Department may require sampling and reporting as a result of illegal discharges, compliance issues, complaint investigations, or other such evidence of contamination from activities at the site. If such an action is needed, the Department will specify in writing any sampling requirements, including such information as location, extent and parameters.

F. RECORDS

1. The permittee shall retain copies of this general permit, the SWPPP and all amendments for the site named in the State Operating Permit, results of any monitoring and analysis and all site inspection records required by this general permit. The records shall be accessible during normal business hours. The records shall be retained for a period of at least three years from the date of the Letter of Termination.

2. The permittee shall provide a copy of the SWPPP to the Department, USEPA, or any local agency or government representative if they request a copy in the performance of their official duties.

3. The permittee shall provide a copy of the SWPPP to those who are responsible for installation, operation, or maintenance of any BMP. The permittee, their representative, and/or the contractor(s) responsible for installation, operation and maintenance of the BMPs shall have a current copy of the SWPPP with them when on the project site.

LAND PURCHASE AND CHANGE OF OWNERSHIP

1. Federal and Missouri stormwater regulations [10 CSR 20-6.200] require a stormwater permit and erosion control measures for all land disturbances of one or more acres. These regulations also require a permit for less than one acre lots if the lot is part of a common plan of development or sale where that plan is at least one acre in size. If the permittee sells less than one acre of the permitted site to an entity for, commercial, industrial, or residential use, (unless sold to an individual for the purpose of building his/her own private residence and in accordance with G.3 of this section) this land remains a part of the common sale and regulated by this permit. Therefore, the permittee is still responsible for erosion control on the sold property until termination of the permit.

2. If the permittee sells one or more acres of the permitted site to an entity, the new owner of the property must obtain a land disturbance permit for the purchased property. The original permittee must amend the SWPPP to show that the property (one acre or more) has been sold and therefore no longer under the original permit jurisdiction.

3. If the permittee has stabilized the less than one acre lot which is part of a larger common plan of development and the lot is sold to an individual for purposes of building his/her own private residence, the permittee is no longer responsible for erosion control on the lot.

4. Property of any size which is part of a larger common plan of development where the property has been stabilized and the original permit terminated will require application of a new land disturbance permit for any future land disturbance activity.

5. If the entire tract is sold to a single entity, then this permit shall be terminated when the new owner obtains a new land disturbance permit for the site.

TERMINATION

This permit may be terminated when the project is stabilized. The project is considered to be stabilized when perennial vegetation, pavement, buildings, or structures using permanent materials cover all areas that have been disturbed. With respect to areas that have been vegetated, vegetation cover shall be at least 70% plant density over 100% of the site. In order to terminate the permit, the permittee shall notify the Department.

The Cover Page (Certificate Page) of the Master General Permit for Land Disturbance specifies the "effective date" and the "expiration date" of the Master General Permit. The "issued date" along with the "expiration date" will appear on the State Operating Permit issued to the applicant. This permit does not continue administratively beyond the expiration date.

If the project or development completion date will be after the expiration date of this general permit, then the permittee must reapply to the Department for a new permit. The applicant must file a request to the Department for a new permit 180 days prior to the expiration of this permit.

If the permittee has not terminated the permit and the permit expires, and the permittee has not applied for a new permit the permittee will be considered "operating without a permit" if the site does not meet the requirements for termination.

MODIFICATION, REVOCATION, AND REOPENING

1. The U.S. Environmental Protection Agency (EPA) has proposed stormwater requirements that may direct the State to reopen this permit. The EPA is proposing to change its construction general permit (CGP) with more prescriptive requirements and design standards for buffers to prevent stormwater runoff, increased monitoring requirements and more frequent inspections. While the EPA permit is only effective in areas where EPA has permitting authority these requirements are likely to act as a template, setting a baseline for the EPA approval of state plans for permitting sites.

2. If at any time the Department determines that the quality of waters of the state may be better protected by reopening this permit, or revoking this permit and requiring the owner/operator of the permitted site to apply for a site-specific permit, the Department may revoke a general permit and require any person to obtain such an operating permit as authorized by 10 CSR 20-6.010(13) and 10 CSR 20-6.200(1)(B).

3. If this permit is reopened, modified or revoked pursuant to this Section, the permittee retains all rights under Chapter 536 and 644 Revised Statutes of Missouri upon the Department's reissuance of the permit as well as all other forms of administrative, judicial, and equitable relief available under law.

J. DUTY TO COMPLY

The permittee must comply with all conditions of this general permit. Any noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

STANDARD CONDITIONS FOR NPDES PERMITS
ISSUED BY
THE MISSOURI DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION
Revised
October 1, 1980

PART I - GENERAL CONDITIONS
SECTION A - MONITORING AND REPORTING

1. **Representative Sampling**
   a. Samples and measurements taken as required herein shall be representative of the nature and volume, respectively, of the monitored discharge. All samples shall be taken at the outfall(s), and unless specified, before the effluent joins or is diluted by any other body of water or substance.
   b. Monitoring results shall be recorded and reported on forms provided by the Department, postmarked no later than the 28th day of the month following the completed reporting period. Signed copies of these, and all other reports required herein, shall be submitted to the respective Department Regional Office, the Regional Office address is indicated in the cover letter transmitting the permit.

2. **Schedule of Compliance**
   No later than fourteen (14) calendar days following each date identified in the "Schedule of Compliance", the permittee shall submit to the respective Department Regional Office as required therein, either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements, or if there are no more scheduled requirements, when such noncompliance will be corrected. The Regional Office address is indicated in the cover letter transmitting he permit.

3. **Definitions**
   Definitions as set forth in the Missouri Clean Water Law and Missouri Clean Water Commission Definition Regulation 10 CSR 20-2.010 shall apply to terms used herein.

4. **Test Procedures**
   Test procedures for the analysis of pollutant shall be in accordance with the Missouri Clean Water Commission Effluent Regulation 10 CSR 20-7015.

5. **Recording of Results**
   a. For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:
      (i) the date, exact place, and time of sampling or measurements;
      (ii) the individual(s) who performed the sampling or measurements;
      (iii) the date(s) analyses were performed;
      (iv) the individual(s) who performed the analyses;
      (v) the analytical techniques or methods used; and
      (vi) the results of such analyses.
   b. The Federal Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six (6) months per violation, or both.
   c. Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

6. **Additional Monitoring by Permittee**
   If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified above, the results of such monitoring shall be included in the calculation and reporting of the values required in the Monitoring Report Form. Such increased frequency shall also be indicated.

7. **Records Retention**
   The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recording for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Department at any time.

SECTION B - MANAGEMENT REQUIREMENTS

1. **Change in Discharge**
   a. All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant not authorized by this permit or any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of the permit.
   b. Any facility expansions, production increases, or process modifications which will result in new, different, or increased discharges of pollutants shall be reported by submission of a new NPDES application at least sixty (60) days before each such changes, or, if they will not violate the effluent limitations specified in the permit, by notice to the Department at least thirty (30) days before such changes.

2. **Noncompliance Notification**
   a. If, for any reason, the permittee does not comply with or will be unable to comply with any daily maximum effluent limitation specified in this permit, the permittee shall provide the Department with the following information, in writing within five (5) days of becoming aware of such conditions:
      (i) a description of the discharge and cause of noncompliance, and
      (ii) the period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent 'recurrence of the noncomplying discharge.
   b. Twenty-four hour reporting. The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally with 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided with five (5) days of the time the permittee becomes aware of the circumstances. The Department may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

3. **Facilities Operation**
   Permittees shall operate and maintain facilities to comply with the Missouri Clean Water Law and applicable permit conditions. Operators or supervisors of operations at publicly owned or publicly regulated wastewater treatment facilities shall be certified in accordance with 10 CSR 209.020(2) and any other applicable law or regulation. Operators of other wastewater treatment facilities, water contaminant source or point sources, shall, upon request by the Department, demonstrate that wastewater treatment equipment and facilities are effectively operated and maintained by competent personnel.

4. **Adverse Impact**
   The permittee shall take all necessary steps to minimize any adverse impact to waters of the state resulting from noncompliance with any effluent limitations specified in this permit or set forth in the Missouri Clean Water Law and Regulations (hereinafter the Law and Regulations), including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge.

5. **Bypassing**
   a. Any bypass or shut down of a wastewater treatment facility and tributary sewer system or any part of such a facility and sewer system that results in a violation of permit limits or conditions is prohibited except:
      (i) where unavoidable to prevent loss of life, personal injury, or severe property damages; and
      (ii) where unavoidable excessive storm drainage or runoff would catastrophically damage any facilities or processes necessary for compliance with the effluent limitations and conditions of this permit;
      (iii) where maintenance is necessary to ensure efficient operation and alternative measures have been taken to maintain effluent quality during the period of maintenance.
   b. The permittee shall notify the Department in writing of all bypasses or shut down that result in a violation of permit limits or conditions. This section does not excuse any person from liability, unless such relief is otherwise provided by the statute.

6. **Removed Substances**
   Solids, sludges, filter backwash, or any other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutants from entering waters of the state unless permitted by the Law, and a permanent record of the date and time, volume and methods of removal and disposal of such substances shall be maintained by the permittee.

7. **Power Failures**
   In order to maintain compliance with the effluent limitations and other provisions of this permit, the permittee shall either:
   a. in accordance with the "Schedule of Compliance", provide an alternative power source sufficient to operate the wastewater control facilities; or,
   b. if such alternative power source is not in existence, and no date for its implementation appears in the Compliance Schedule, halt or otherwise control production and all discharges upon the reduction, loss, or failure of the primary source of power to the wastewater control facilities.

8. **Right of Entry**
   For the purpose of inspecting, monitoring, or sampling the point source, water contaminant source, or wastewater treatment facility for compliance with the Clean Water Law and these regulations, authorized representatives of the Department, shall be allowed by the permittee, upon presentation of credentials and at reasonable times;
   a. to enter upon permittee's premises in which a point source, water contaminant source, or wastewater treatment facility is located or in which any records are required to be kept under terms and conditions of the permit;
   b. to have access to, or copy, any records required to be kept under terms and conditions of the permit;
   c. to inspect any monitoring equipment or method required in the permit;
   d. to inspect any collection, treatment, or discharge facility covered under the permit; and
   e. to sample any wastewater at any point in the collection system or treatment process.

9. **Permits Transferable**
   a. Subject to Section (3) of 10 CSR 20-6.010 an operating permit may be transferred upon submission to the Department of an application to transfer signed by a new owner. Until such time as the permit is officially transferred, the original permittee remains responsible for complying with the terms and conditions of the existing permit.
   b. The Department, within thirty (30) days of receipt of the application shall notify the new permittee of its intent to revoke and reissue or transfer the permit.

10. **Availability of Reports**
   Except for data determined to be confidential under Section 308 of the Act, and the Law and Missouri Clean Water Commission Regulation for Public Participation, Hearings and Notice to Governmental Agencies 10 CSR 20-6.020, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department. As required by statute, effluent data shall not be considered confidential. Knowingly making any false statement on any such report shall be subject to the imposition of criminal penalties as provided in Section 204.076 of the Law.

11. **Permit Modification**
   a. Subject to compliance with statutory requirements of the Law and Regulations and applicable Court Order, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:
      (i) violation of any terms or conditions of this permit or the Law;
      (ii) having obtained this permit by misrepresentation or failure to disclose fully any relevant facts;
      (iii) a change in any circumstances or conditions that requires either a temporary or permanent reduction or elimination of the authorized discharge, or
      (iv) any reason set forth in the Law and Regulations.
   b. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

12. **Permit Modification - Less Stringent Requirements**
   If any permit provisions are based on legal requirements which are lessened or removed, and should no other basis exist for such permit provisions, the permit shall be modified after notice and opportunity for a hearing.

13. **Civil and Criminal Liability**
   Except as authorized by statute and provided in permit conditions on "Bypassing" (Standard Condition B-5) and "Power Failures" (Standard Condition B-7) nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

14. **Oil and Hazardous Substance Liability**
   Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act, and the Law and Regulations. Oil and hazardous materials discharges must be reported in compliance with the requirements of the Federal Clean Water Act.

15. **State Laws**
   Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state statute or regulations.

16. **Property Rights**
   The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of or violation of federal, state or local laws or regulations.

17. **Duty to Reapply**
   If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for a new permit 180 days prior to expiration of this permit.

18. **Toxic Pollutants**
   If a toxic effluent standard, prohibition, or schedule of compliance is established, under Section 307(a) of the Federal Clean Water Act for a toxic pollutant in the discharge of permittee's facility and such standard is more stringent than the limitations in the permit, then the more stringent standard, prohibition, or schedule shall be incorporated into the permit as one of its conditions, upon notice to the permittee.

19. **Signatory Requirement**
   All reports, or information submitted to the Director shall be signed (see 40 CFR-122.6).

20. **Rights Not Affected**
   Nothing in this permit shall affect the permittee's right to appeal or seek a variance from applicable laws or regulations as allowed by law.

21. **Severability**
   The provisions of this permit are severable, and if any provisions of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

Missouri
Department of
Natural Resources

STORMWATER DISCHARGES FROM THIS LAND DISTURBANCE SITE ARE AUTHORIZED BY THE MISSOURI STATE OPERATING PERMIT NUMBER:

ANYONE WITH QUESTIONS OR CONCERNS ABOUT STORMWATER DISCHARGES FROM THIS SITE, PLEASE CONTACT THE MISSOURI DEPARTMENT OF NATURAL RESOURCES AT

1-800-361-4827

State of Missouri
Missouri Department of Natural Resources

FACT SHEET

MORA00000 LAND DISTURBANCE GENERAL PERMIT
2012 Reissue

The Federal Water Pollution Control Act ("Clean Water Act" Section 402 Public Law 92-500 as amended) established the National Pollution Discharge Elimination System (NPDES) permit program. This program regulates the discharge of pollutants from point sources into the waters of the United States, and the release of stormwater from certain point sources. All such discharges are unlawful without a permit (Section 301 of the "Clean Water Act"). After a permit is obtained, a discharge not in compliance with all permit terms and conditions is unlawful. Missouri State Operating Permits (MSOPs) are issued by the Director of the Missouri Department of Natural Resources (Department) under an approved program, operating in accordance with federal and state laws (Federal "Clean Water Act" and "Missouri Clean Water Law" Section 644 as amended). MSOPs are issued for a period of five (5) years unless otherwise specified.

As per [40 CFR Part 124.8(a)] and [10 CSR 20-6.020(1)2.] a Factsheet shall be prepared to give pertinent information regarding the applicable regulations, rationale for the development of effluent limitations and conditions, and the public participation process for the Missouri State Operating Permit (operating permit) listed below.

A Factsheet is not an enforceable part of an operating permit.

This Factsheet is for a Major ☐, Minor ☐, Industrial Facility ☐; Variance ☐;
Master General Permit ☒; General Permit Covered Facility ☐; and/or permit with widespread public interest ☐.

PART I. NPDES Stormwater General Permit

The vast majority of discharges associated with construction activity are covered under NPDES general permits. General permits cover a group of similar dischargers under one permit. General permits simplify the process for dischargers to obtain authorization to discharge, provide permit requirements for any discharger that applies for coverage, and reduce the administrative workload for NPDES permitting authorities.

This General Permit is for regulating stormwater discharge at land disturbance construction sites in Missouri. This program requires the owner or operator of a construction site disturbing land of one acre or greater, or less than one acre but part of a larger common plan of development, to obtain this permit prior to conducting any land disturbance activity.

ART II. The Need for Stormwater Regulations at Construction Sites

Stormwater runoff is a major source of urban water pollution endangering humans by polluting the water resources used for drinking, household purposes, recreation and fishing. Stormwater discharges often contain pollutants in amounts that could reduce water quality. The primary pollutants of concern from construction activities are silt and sediment, but other pollutants such as oils and grease, vehicle fluids, and debris are present as well.

Stormwater runoff from construction activities can have a significant impact on water quality. As stormwater flows over a construction site, it can pick up pollutants like sediment, debris, and chemicals and transport these to a nearby storm sewer system or directly to a river, lake, or coastal water. Polluted stormwater runoff can harm or kill fish and other wildlife. Sedimentation can destroy aquatic habitat, and high volumes of runoff can cause stream bank erosion. Debris can clog waterways and potentially reach the ocean where it can kill marine wildlife and impact habitat.

Construction activities increase pollutant loads in runoff. The volume and rate of runoff are typically increased, providing a larger capacity to transport pollutants to rivers and lakes. In addition, the removal of vegetation leaves bare soil which is much more vulnerable to erosion, resulting in sediment moving into receiving waters.

Additional stormwater information and requirements including application for a land disturbance permit can be found at http://dnr.mo.gov/env/wpp/stormwater/sw-land-disturb-permits.htm.

ART III. Key Components of this Permit

The key components of this permit are effluent limitations that require the permittee to minimize discharge of pollutants in stormwater by using control measures that reflect best engineering practices base on federal and state government best professional judgment. Dischargers must minimize their discharge of pollutants in stormwater using appropriate erosion and sediment controls and control measures for other pollutants such as litter, construction debris, and construction chemicals that could be exposed to stormwater and other wastewater. This general permit requires dischargers to develop a stormwater pollution prevention plan (SWPPP) to document the steps they will take to comply with the terms, conditions and effluent limitations of the permit. Note that the SWPPP is not an effluent limitation, nor does it include effluent limitations. Information including examples of a SWPPP can be found at the following http://cfpub.epa.gov/npdes/stormwater/swppp.cfm#model. These examples should be used for educational or training purposes only. Construction site SWPPPs must be developed following the requirements of Missouri's land disturbance permit and describe the specific conditions of the site and plans for development.

ART IV. Additional Information for the Purpose of Permit Clarity

Applicability

- **"Industrial stormwater run-off"** are activities that take place at industrial facilities, such as material handling and storage, that are often exposed to the weather. As runoff from rain or snowmelt comes into contact with these activities, it can pick up pollutants and transport them to a nearby storm sewer system or directly to a river, lake, or coastal water. To minimize the impact of stormwater discharges from industrial facilities, the NPDES program includes an industrial stormwater permitting component that covers 10 categories of industrial activity that require authorization under an NPDES industrial stormwater permit for stormwater discharges. More information on industrial permit requirements can be found at http://dnr.mo.gov/env/wpp/stormwater/sw-industrial-permits.htm.

- A **"larger common plan of development or sale"** is a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan. For example, if a developer buys a 20-acre lot and builds roads, installs pipes, and runs electricity with the intention of constructing homes or other structures sometime in the future, this would be considered a larger common plan of development or sale. If the land is parceled off or sold, and construction occurs on plots that are less than one acre by separate, independent builders, this activity still would be subject to stormwater permitting requirements if the smaller plots were included on the original site plan. Other than the less than one acre property sold to the individual for construction of their personal residence, property of any size which is part of a larger common plan of development where the property has been stabilized and the original permit terminated will require application of a new land disturbance permit for any future land disturbance activity. The larger common plan of development or sale also applies to other types of land development such as industrial parks or well fields. A permit is required if one or more acres of land will be disturbed, regardless of the size of any of the individually-owned or developed sites.

- Documentation of Permit Eligibility Related to **Endangered Species:** The SWPPP must include documentation supporting a determination of permit eligibility with regard to Endangered Species.

  For more information please visit the following links:

  For information on understand what critical habitat is, please go to the following link, www.fs.fed.us/r9/wildlife/tes/docs/esa_references/critical_habitat.pdf.

  For information on listed species by State & County, please go to the following link, http://cfpub.epa.gov/npdes/stormwater/esa.cfm.

The Missouri Department of Conservation's internet site for the Natural Heritage Review may be very helpful and can be found at the following link, http://mdcgis.mdc.mo.gov/heritage/newheritage/heritage.htm. Also helpful are the local offices of the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS), these centers often maintain lists of federally listed endangered or threatened species on their internet sites.

If there are listed species in the county or township, check to see if critical habitat has been designated and if that area overlaps or is near the project area. Critical habitat designations and associated requirements may also be found at 50 CFR Parts 17 and 226. For additional information, use the mapview tool at http://criticalhabitat.fws.gov/crithab/ to find data specific to your state and county.

- A Clean Water Act **Section 404 Department of the Army Permit** and the Department's Clean Water Act Section 401 Water Quality Certification (certification) are needed when placing material or fill into jurisdictional waters of the United States. Any impacts to jurisdictional streams or wetlands would require an application to be sent to the appropriate US Army Corps of Engineers District Regulatory Branch. A map of the district offices and contact information can be located online at: http://www.dnr.mo.gov/env/wpp/401/corps-map3.gif). Not all land disturbance projects will require a 404 permit; however, if a 404 permit is required, land disturbance activities are not to be conducted in the jurisdictional area of the project until the 404 permit has been obtained. A discussion on the need for a 404/401 permit as a requirement of this permit and is to be included in the SWPPP.

Exemptions from Permit Requirements

The USEPA defines **linear projects** to include the construction of roads, bridges, conduits, substructures, pipelines, sewer lines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities in a long, narrow area. Missouri regulation 10 CSR 20-6.200 (1)(B) 8 exempts linear project construction from stormwater permit regulations which meet one of the following: A. Grading of existing dirt or gravel roads which does not increase the runoff coefficient and the addition of an impermeable surface over an existing dirt or gravel road; B. Cleaning or routine maintenance of roadside ditches, sewers, waterlines, pipelines, utility lines or similar facilities; C. Trenches two (2) feet in width or less; or D. Emergency repair or replacement of existing facilities as long as best management practices are employed during the emergency repair.

Permit Requirements

- The permittee is required to conduct inspections of the site. The person(s) inspecting the site may be a staff person or a hired third party to conduct such inspections. The permittee is responsible for ensuring that the person who conducts inspections is a "qualified person or personnel." A **"qualified person"** is a person knowledgeable in the principles and practice of erosion and sediment controls and pollution prevention, who possesses the skills to assess conditions at the construction site that could impact stormwater quality, and the skills to assess the effectiveness of any stormwater controls selected to control the quality of stormwater discharges from the construction activity.

- A sample **inspection report** has been developed as a helpful tool to aid in completing site inspections. This sample inspection report was created consistent with USEPA's Developing Your Stormwater Pollution Prevention Plan and can be found at http://www.epa.gov/npdes/pubs/sw_swppp_inspection_form.doc. Both the guide and the sample inspection report (formatted in Microsoft Word) can be found at http://cfpub.epa.gov/npdes/stormwater/swppp.cfm.

- For common drainage locations that serve an area with 10 or more acres disturbed at one time, a temporary (or permanent) **sediment basin** that provides storage for a calculated volume of runoff from the drainage area from a 2-year, 24-hour storm, or equivalent control measures, must be provided where attainable until final stabilization of the site. Where no such calculation has been performed, a temporary (or permanent) sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent control measures, must be provided where attainable until final stabilization of the site. When computing the number of acres draining into a common location, it is not necessary to include flows from offsite areas and flows from on-site areas that are either undisturbed or have undergone final stabilization where such flows are diverted around both the disturbed area and the sediment basin. In determining whether installing a sediment basin is attainable, the operator may consider factors such as site soils, slope, available area on-site, etc. In any event, the operator must consider public safety, especially as it relates to children, as a design factor for the sediment basin, and alternative sediment controls must be used where site limitations would preclude a safe design.

- Public Notification: A public notification sign has been added to the permit. If a different sign is to be used it should be one of the same size sign and lettering and containing the same information as that of the one supplied with the permit. The required information includes a statement for those with questions or concerns, the permit number and the Department's toll free phone number. The permittee shall post a copy of the public notification sign described by the Department at the main entrance to the site. An alternate location is acceptable provided the public can see it and it is noted in the SWPPP. The public notification sign must remain posted at the site until the permit has been terminated.

Other Discharges

- Machinery should be kept out of the waterway as much as possible. Fuel, oil and other petroleum products, equipment and any solid waste should not be stored below the ordinary high water mark at any time or in the adjacent floodway beyond normal working hours. All precautions are to be taken to avoid the release of wastes or fuel as a result of this operation. Petroleum products spilled should be immediately cleaned up and disposed of properly. Any such **spills of petroleum or other chemicals** are to be reported as soon as possible to the Department's 24-hour Environmental Emergency Response number at (573) 634-2436.

Sampling Requirements and Other Effluent Limitations

- 40 CFR 450.21 Subpart B - Construction and Development (C&D) Effluent Guidelines are **non-numeric effluent limits** and are structured to require construction operators to first prevent the discharge of sediment and other pollutants through the use of effective planning and erosion control measures; and second, to control discharges that do occur through the use of effective sediment control measures. Permittees are also required to implement a range of pollution prevention measures to limit or prevent discharges of pollutants including those from dry weather discharges. The C&D rule's non-numeric effluent limits are available at the following internet site: http://www.gpo.gov/fdsys/pkg/CFR-2010-title40-vol29/xml/CFR-2010-title40-vol29-sec450-21.xml. The associated fact sheet can be found at: http://www.epa.gov/npdespub/pubs/cgp_proposedfs.pdf.

The USEPA has proposed numeric **effluent limitation guidelines** (ELGs) to control the discharge of pollutants from construction sites of a certain size. The Department may modify this permit upon finalization of the USEPA effluent limitation guidelines. The proposed Effluent limitation guidelines can be view at the following website http://water.epa.gov/scitech/wastetech/guide/construction/.

Land Purchase and Change of Ownership

- A person having **operational control over only a portion of a larger project** (e.g., one of four homebuilders in a subdivision), is responsible for compliance with all applicable effluent limits, terms, and conditions of the permit as it relates to the activities on that portion of the construction site, including protection of endangered species, critical habitat, and historic properties, and implementation of control measures described in the SWPPP. This person must ensure either directly or through coordination with other permittees, that these activities do not render another party's pollutant discharge controls ineffective. This person must either implement their own portion of a common SWPPP or develop and implement their own SWPPP. For more effective coordination of BMPs and opportunities for cost sharing, a cooperative effort by the different operators at a site to prepare and participate in a comprehensive SWPPP is encouraged. Individual operators at a site may, but are not required to, develop separate SWPPPs that cover only their portion of the project provided referenced is made to other operators at the site. In instances where there is more than one SWPPP for a site, cooperation between the permittees is encouraged to ensure stormwater discharge control measures are consistent with one another (e.g., provisions to protect listed species and critical habitat).

- The Department does not allow the transfer of a land disturbance permit from one owner to another; however, to facilitate the change in the ownership status of a property the Department developed the "Application for Change of Ownership" form. This form will allow the new owner to receive a new permit and number. The form may also be used to terminate the original permit if all the property included in the original permit is no longer the responsibility of the original owner. The "Application for Change of Ownership" (form MO780-2051) can be found online at http://www.dnr.mo.gov/forms/#StormWater.

Termination

- To begin the process of terminating this permit, the permittee should submit Form H – "Request for Termination" (MO780-1409) to the Department. The form can be found at the following web location: http://www.dnr.mo.gov/forms/#StormWater.

ART V. Addendums to Fact Sheet

Addendum #1

Individual Lot Certification

This form is not a requirement of the permit, but may be used by the permittee when selling individual lots that are part of the property that has been authorized by a Missouri Water Pollution Control General Permit under the NPDES for stormwater discharged associated with construction activity. This is a certification between the purchaser and the seller to cooperatively implement the SWPPP and the conditions of the NPDES permit and does not constitute a transfer of the permit. The permittee shall maintain this form on-site, or in a readily available location. The permittee shall provide individual lot certification forms or a copy of the contract for land sale having the equivalent wording to the Missouri Department of Natural Resources.

Addendum #2

Response to Comments

The public comment period for this permit expired on October 30, 2011. Addendum #2 contains the Missouri Department of Natural Resources' response to comments received during the public comment period.

ADDENDUM #1
INDIVIDUAL LOT CERTIFICATION

For Storm Water Discharges Associated with Construction Activity Authorized by a Missouri Water Pollution Control General Permit under the National Pollutant Discharge Elimination System

TO BE COMPLETED BY THE NEW LOT OWNER

I certify, under penalty of law, that I have received a copy of the general NPDES permit referenced below, which authorized the original lot owner or developer to discharge storm water runoff from construction activities, and the Storm Water Pollution Prevention Plan (SWPPP) prepared by the original lot owner or developer. I have reviewed the terms and conditions of the general permit and the SWPPP. I accept responsibility for erosion and sediment control during construction of the home or building for each of the lot(s) listed below. In the event the Missouri Department of Natural Resources notifies the undersigned of water quality violations due to conditions at any lot listed below and I am unable or unwilling to take action within 30 days to further reduce erosion or control sediment, then I agree to allow the original lot owner or developer to have reasonable access to the site to implement erosion and sediment control measures. I understand this certification is an agreement between the purchaser and seller to cooperatively implement the SWPPP and the conditions of the general NPDES permit.

Facility Name: ______________________________
(as listed on permit)

Permit Number: MOR ______________________________

Lot Number(s): ______________________________

New Owner's Signature: ______________________________

Name (typed or printed): ______________________________

Phone Number: ______________________________

Complete Only if New Owner is a Corporation and not an Individual:

Company Name: ______________________________

Company Address: ______________________________

Company Phone #: ______________________________

TO BE COMPLETED BY THE PERMIT HOLDER

As permittee for the overall tract wherein the above listed lot(s) are located, I certify that I have provided the above named lot purchaser with a copy of the general NPDES permit and the Storm Water Pollution Prevention Plan (SWPPP) for the project, and I have informed the lot purchaser of their responsibility to minimize erosion and control sedimentation. I understand this certification does not constitute a transfer of the permit and understand this certification is an agreement between the purchaser and seller to cooperatively implement the SWPPP and the conditions of the general NPDES permit.

Signature: ______________________________

Name (typed or printed): ______________________________

Phone Number: ______________________________

The permittee shall maintain this form on-site, or in a readily available location. The permittee shall provide individual lot certifications forms or a copy of the contract for land sale having the equivalent wording to the Missouri Department of Natural Resources upon request.

ADDENDUM #2

MORA00000 Land Disturbance Permit
Response to Public Notice Comments

(The Missouri Department of Natural Resources' public notice comment period for this permit expired on October 30, 2011.)

GENERAL COMMENT RESPONSES

LAND DISTURBANCE PERMIT MOR100

The Department received certain comments specifically related to the MOR100 permit (the area-wide permit for state, federal, local government, etc.). These comments may be considered in the development of that permit. The MOR100 permit expires March 2012. There has been no change to the permit as a result of these comments.

FEDERAL REGULATION 40 CFR 450.21

As the NPDES authorized permitting authority, the Department is required to incorporate into the permit the federal regulation 40 CRF 450.21. These are non-numeric effluent limitations reflecting the best practicable technology currently available (BPT). Some limitations come with the words "unless infeasible." The Department received several questions on who determines what is or isn't feasible. The owner or operator is to make the determination for a specific project site if a requirement is infeasible and document in the SWPP as to why it is infeasible. There has been no change to the permit as a result of this comment.

EPERMITING and FEES

The Department received a few comments regarding electronic permitting (epermitting) and permit fees. These comments have been relayed to the respective workgroups. The first phase of epermitting is expected to be completed mid-year 2012 and will include the issuance of new land disturbance permits. At this time, all renewals will be processed without epermitting. More information regarding electronic permitting will be placed on the Department's webpage in the very near future. There has been no change to the permit as a result of these comments.

TYPOS/RENUMBERING/DEFINITIONS

The Department received comments regarding typos, renumbering and similar items in the proposed permit. These entries have been corrected in the final permit.

The Department received comments suggesting definition and clarification to several areas of the proposed permit. All suggestions were considered and many have been added to the permit Fact Sheet.

SPECIFIC COMMENT RESPONSES

SECTION A. APPLICABILITY

OWNER/OPERATOR

Section A.1. - The Department received comments regarding the owner/operator statement asking for clarification of primary responsibility for compliance with the permit and to expand the responsibility to include the holder of an easement on the property as an alternative to the property owner. If there are enforcement actions the Department has the authority to involve all parties as necessary and to the extent possible. The Department has revised the applicability language to include easement in lieu of property owners where appropriate.

The Department received a comment requesting there be a differentiating permit between land development and vertical house construction. With exception to lots that are part of a larger common plan of development or sale, this permit is required for land disturbances for any reason based on the size (the acreage) of the disturbance. There has been no change to the permit as a result of this comment.

The Department received comments requesting the inclusion of other areas (borrow pits) which are outside the permitted area as well as an allowance for a specific activity (portable concrete and asphalt plants) to be listed in the permit. The Department believes that the permitted areas should be sufficiently stated in the application and the SWPPP to include all areas where land disturbance activities are planned to take place. There has been no change to the permit as a result of these comments.

DISCHARGES

Section A.2. - The Department received a comment asking to identify non-stormwater discharges. For the purposes of this rule, non-stormwater discharges are identified in this section of the permit. There has been no change to the permit as a result of this comment.

Section A.2. - The Department received comments requesting we add "flushing fire hydrants and potable water lines" back to the list of authorized non-stormwater discharges. Current regulation (10CSR 20.6.010 (1) (B)7) exempts these discharges from all general permitting. However, the Department has added these items back to the permit.

Section A.4. - The Department has clarified, in the permit Fact Sheet, what is meant by "industrial stormwater runoff ".

OTHER FEDERAL REGULATION

Section A.8. - A Clean Water Act Section 404 Department of the Army Permit and the Department's Clean Water Act Section 401 Water Quality Certification (certification) are needed when placing material or fill into jurisdictional waters of the United States. Any impacts to jurisdictional streams or wetlands would require an application to be sent to the appropriate US Army Corps of Engineers District Regulatory Branch. Contact information can be found at http://www.dnr.mo.gov/env/wpp/401/corps-map3.gif. Not all land disturbance projects will require a 404 permit; however, if a 404 permit is required then land disturbance activities are not to be conducted in the jurisdictional area of the project until the 404 permit has been obtained. Language in the permit has been reworded and additional information added to the permit Fact Sheet to help better clarify this concern.

Section A.9. - Compliance with the Historic Preservation Act and the Endangered Species Act is not a requirement to obtain a land disturbance permit. However, NPDES permittees must be in compliance with these federal regulations. The Department has added a statement to the permit Fact Sheet, that this permit does not supersede compliance with other federal requirements.

Section A.10. – The Department added language to the permit that the permit does not superseded any local authority requirement to obtain approval for a land disturbance project.

SECTION B. EXEMPTIONS FROM PERMIT REQUIREMENTS

Section B.2. – The Department received a comment requesting that we list the general permit exemptions outlined in the cited regulations. Missouri State Regulations 10CSR 20-6.200 (1) (B) and 10 CSR 20.6.010 (1) (B) outline exemptions from NPDES stormwater permits and all NPDES general permits, respectively. There has been no change to the permit as a result of this comment.

Section B.3. – The Department received comments requesting we include the words "maintenance operations" in this sentence. The permit language has been updated with this inclusion. A discussion on linear, strip, and ribbon construction and maintenance exemptions can be found in the permit Fact Sheet.

Section B.5. – The Department received a comment recommending the inclusion of CAFOs in the Agriculture Exemption. The Department removed the second sentence from the draft permit so that this section continues to read as it did in the previous permit.

SECTION C. REQUIREMENTS

Section C.1. a-g. – This section of the permit outlines verbatim the federal requirements of 40 CFR 450.21 effluent limitations reflecting the best practicable technology currently available (BPT). These are non-numeric effluent limits which the NPDES permitting authority must include in the permit. The Department received several comments regarding this section of the permit; it was recommended that we remove this section of the permit, it was recommended that we delete some of the wording, and there were comments which questioned the practicality of some items. When the Department does not have design guidelines for federal requirements, it is left to the discretion of the stormwater professional as to the proper design protocol. There were no changes to the permit as a result of these comments.

Section C.2.e. – The Department received comments regarding the need to comply with 404/401 permitting versus the requirement to comply in order to obtain a stormwater permit and identifying this in the SWPPP. The Department has added language to the permit Fact Sheet which describes the SWPPP requirement regarding 404/401permitting is only to verify that the need for a 404/401 permit was addressed. For additional discussion on the 404/401 requirement, please refer to the Department's response to Section A.8. of this document.

SELECTION OF TEMPORARY AND PERMANENT NON-STRUCTURAL BMPS

Section C.3.e. – The Department received several comments regarding this section of the permit. The requirement of a buffer is part of federal regulation 40 CFR 450.21. This is the federal requirement which covers the non-numeric effluent limits which the permitting authority must include in the permit.

The regulation states, "The permittee is to provide and maintain natural buffers around surface waters, direct stormwater to vegetated areas to increase sediment removal and maximize stormwater infiltration, unless infeasible.." The permit requires a 25-foot buffer at minimum. The Department has added language to the permit which will allow for a more stringent local government buffer requirement.

For additional related discussion please refer to the earlier section of this document titled "General Comment Responses"

DISTURBED AREAS

Section C.3.h. - The Department received several comments regarding this section of the permit. Stabilization is addressed in federal regulation 40 CFR 450.21. This is the federal requirement which covers the non-numeric effluent limits which the permitting authority must include in the permit. The regulation states - "Stabilization of disturbed areas must, at minimum, be initiated immediately whenever any clearing, grading, excavating or other earth disturbing activities have permanently ceased on any portion of the site, or temporarily ceased on any portion of the site nd will not resume for a period exceeding 14 calendar days. Stabilization must be completed within a period of time determined by the permitting authority." The Department has included the exact federal language into the permit and has designated a period of 7 days to complete stabilization activities. Temporary (interim) stabilization clarification: Stabilization is to begin as soon as the operator knows an area will need interim stabilization. The Department has also included, in the permit, allowances for weather and equipment malfunctions. For additional related discussion please refer to the earlier section of this document titled "General Comment Responses"

BMP INSTALLATION

Section C.3.i. – The Department received one comment regarding the installation of BMPs and another comment recommending the words "not to exceed 24 hours" be added after the word "immediately". The permit will continue to allow for certain BMP installations to occur after initial site clearing to establish entry, exit and access and to require that stormwater controls be installed immediately after the earth disturbance. There were no changes to the permit as a result of this comment.

SEDIMENT BASINS

Section C.3.j. – The Department received two comments regarding the removal of sediments from sediment basins. The Department additionally received suggested wording when the use of sediment basin is impracticable. The Department has made changes to the permit to address these comments. The Department also received a comment regarding the feasibility of the use of outlet structures that withdraw water from the surface. Withdrawing water from the surface is a requirement of federal regulation 40 CFR 450.21. This is the federal requirement which covers the non-numeric effluent limits which the permitting authority must include in the permit. For additional related discussion please refer to the earlier section of this document titled "General Comment Responses".

ROADWAYS

Section C.3.m. – The Department received several similar comments on this section of the permit and has responded with rewording the second sentence of this paragraph. The new sentence reads, "Stormwater inlets susceptible to receiving sediment from the permitted land disturbance site shall have curb inlet protection." In addition, the Department has reworded the last sentence of this paragraph. The new sentence reads; "Where practicable, construction entrance BMP controls shall be used to prevent sediment track-out".

Section C.6. - This section has to do with the individual designated by the permittee as responsible for environmental matters. This section has been moved so that it precedes Section C.9. Site Inspection Reports.

AMENDING AND UPDATING THE SWPPP

Section C.8.e. - The proposed permit states, "SWPPP is determined to be ineffective in preventing or controlling erosion and sedimentation (e.g., there is visual evidence of excessive site erosion or excessive sediment deposits in streams or lakes). The Department received two comments recommending a change to this sentence. The Department has replaced the word "preventing" with the word "minimizing" in the final permit.

Section C.8.g. - The Department changed this line to read "Exceedances of effluent limitations for new source performance standards for construction activities in accordance with 40 CFR Part 450.21." This is the federal requirement which covers the non-numeric effluent limits which the permitting authority must include in the permit. For additional related discussion please refer to the earlier section of this document titled "General Comment Responses".

INSPECTION REPORTS

Section C.9. - The Department received several comments regarding site inspection reports. The Department has made changes to this section of the permit to address most of the comments received. The Department added the words "When practicable" to the middle sentence of the first paragraph so that it reads, "When practicable the receiving stream shall also be inspected for 50 feet downstream of the outfall." The Department has made changes to the last sentence of the first paragraph so that it now reads, "If rainfall causes stormwater runoff to occur on-site, the BMPs must be inspected within a reasonable time period after the rainfall event has ceased. Inspections must occur within 48 hours during normal work days, plus an additional 24 hours for each non-workday for weekends and holidays."

PUBLIC NOTIFICATION

Section C.12. - The Public Notification sign is included with the issued permit. The Department has added language to the permit Fact Sheet to describe what is acceptable should a different sign be posted. An alternate location is acceptable provided the public can see it and it is noted in the SWPPP.

SECTION E. SAMPLING REQUIREMENTS AND EFFLUENT LIMITATIONS

Section E.2. - The Department received several comments regarding the proposed effluent limitations. Commenters have requested that the settleable solid limit remain at 2.5 ml/L just as it was in the previous standard land disturbance permit. The permit has been revised to a seattleable solid (SS) limit of 2.5 ml/L per Standard Methods 2540 F and includes a local 2-year 24-hour storm event. Runoff and peak discharge information can be found online at ftp://ftp-fc.sc.egov.usda.gov/MO/eng/EFH/EFH_MO_Sup_Chap_02-1.pdf.

SECTION G. LAND PURCHASE AND CHANGE OF OWNERSHIP

The Department received four comments related to this section of the permit. In addition to recommendations received from commenters, the Department has also looked at how other states address this area of their permit. To better clarify the Department's intent with regard to property belonging to "a larger common plan of development or sale" a new statement has been added to the permit. This statement as well as language in the permit Fact Sheet clarifies that any property which was once permitted as "a larger common plan of development or sale" will require and an application for a new permit for any future land disturbance on that property.

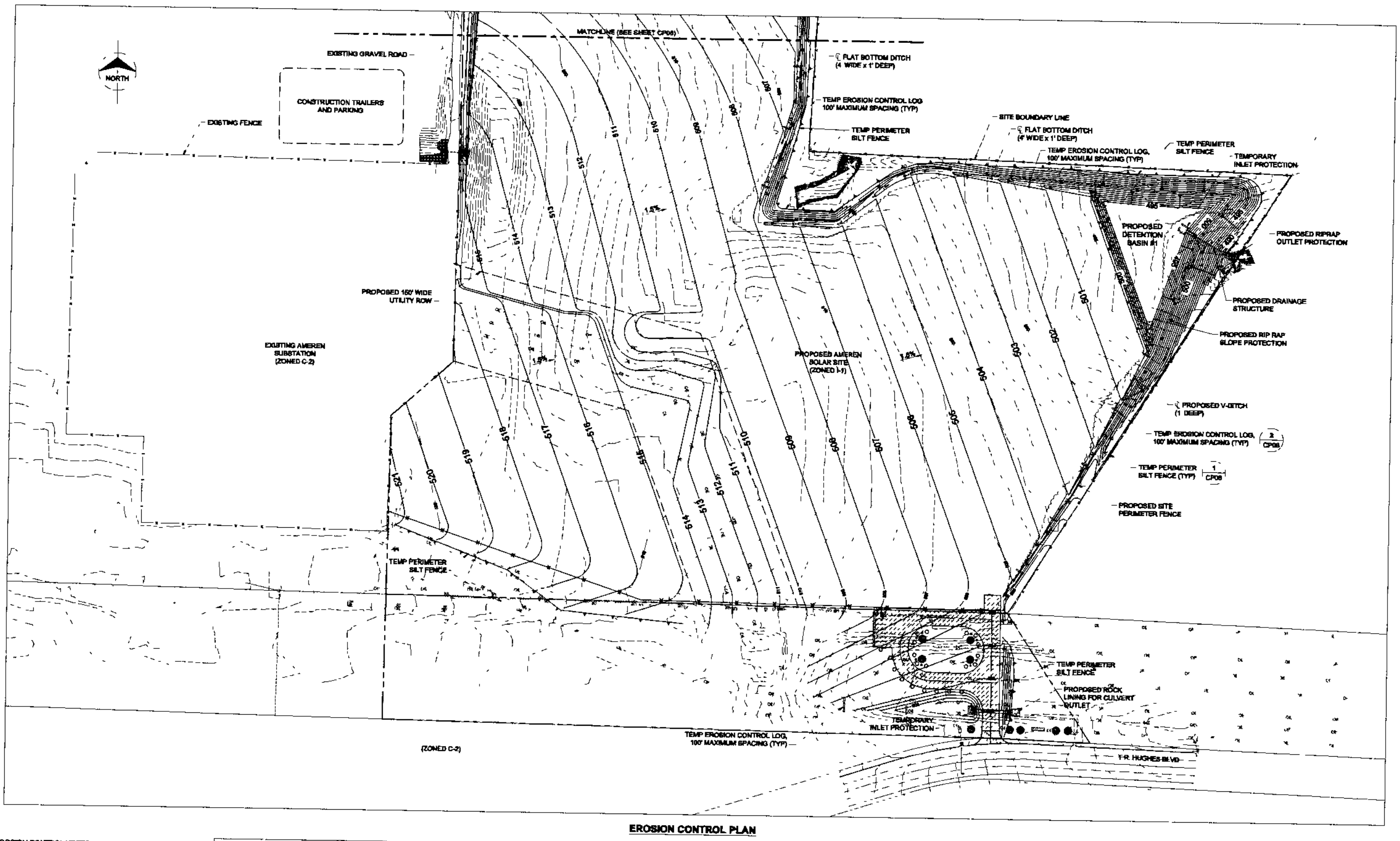
The Department received a request that there be a differentiating permit between land development and vertical house construction. The Department would need more discussion and justification to fully explore and respond to this request. There has been no change to the permit as a result of this comment.

SECTION H. TERMINATION

The Department received a few comments regarding permit transfer and permit coverage continuance. The Department does not allow the transfer of a land disturbance permit from one owner to another; however, to facilitate the change in the ownership status of a property the Department developed the "Change of Ownership" form. This is an application that will allow the new owner to receive a new permit and number. The form may also be used to terminate the original permit if all the property included in the original permit is no longer the responsibility of the original owner. The "Change of Ownership" application form can be found online at http://dnr.mo.gov/forms/index.html#WaterPollution. This web location has been added to the permit Fact Sheet.

The Department received a comment regarding the administrative continuance of an issued permit. This permit does not continue administratively. The permit is not valid after the expiration date. A new permit would need to be issued for the site where work has not been completed and the property has not been stabilized in accordance with the termination requirements. Language has been added to the permit in order to better clarify this issue.

APPENDIX B – EROSION CONTROL PLAN



EROSION CONTROL PLAN

TEMPORARY EROSION CONTROL NOTES

1 TEMPORARY EROSION CONTROL MEASURES SHALL BE INSTALLED AND INSPECTED IN ACCORDANCE WITH THE CITY OF O'FALLON GRADING ORDINANCE NO 5242

2 TEMPORARY EROSION CONTROL SYSTEMS SHALL BE COORDINATED WITH THE PERMANENT EROSION CONTROL FEATURES TO ENSURE EFFECTIVE AND CONTINUOUS EROSION CONTROL

3. TEMPORARY EROSION CONTROL SYSTEMS SHALL BE IMPLEMENTED BEFORE GRADING OPERATIONS BEGIN

4 EITHER TEMPORARY EROSION CONTROL MEASURES OR PERMANENT MEASURES (TABLE A) MUST BE INSTALLED TO STABILIZE DISTURBED AREAS WITHIN FOURTEEN DAYS AFTER GRADING ACTIVITY HAS CEASED IN ANY AREA.

TABLE A

FEATURE	TEMPORARY EROSION/ SEDIMENT CONTROL MEASURES	PERMANENT MEASURES
CULVERTS	TEMPORARY INLET PROTECTION AT ALL CULVERT INLETS	PROPOSED RIPRAP OUTLET PROTECTION IN LOCATIONS SHOWN ON THE PLANS
DITCHES	TEMPORARY EROSION CONTROL LOGS IN LOCATIONS SHOWN ON THE PLANS	PROPOSED AGGREGATE LINING AS INDICATED ON SHEET CP07
3 1 SLOPES	TEMPORARY SEEDING AND EROSION CONTROL BLANKET	PROPOSED RIPRAP SLOPE PROTECTION OR FINAL SEEDING AND EROSION CONTROL BLANKET IN LOCATIONS INDICATED ON SHEET CP07
SLOPES FLATTER THAN 3 1	TEMPORARY SEEDING AND MULCH	PROPOSED AGGREGATE SURFACING OR FINAL SEEDING AND MULCH IN LOCATIONS INDICATED ON SHEET CP07

PRELIMINARY - NOT FOR CONSTRUCTION

0 60' 120'
SCALE IN FEET

BMCD# 77051

AMEREN COG SOLAR PROJECT
5 7 MW DC (4.5 MW AC) PV POWER PLANT
CITY OF O'FALLON MISSOURI

EROSION CONTROL PLAN

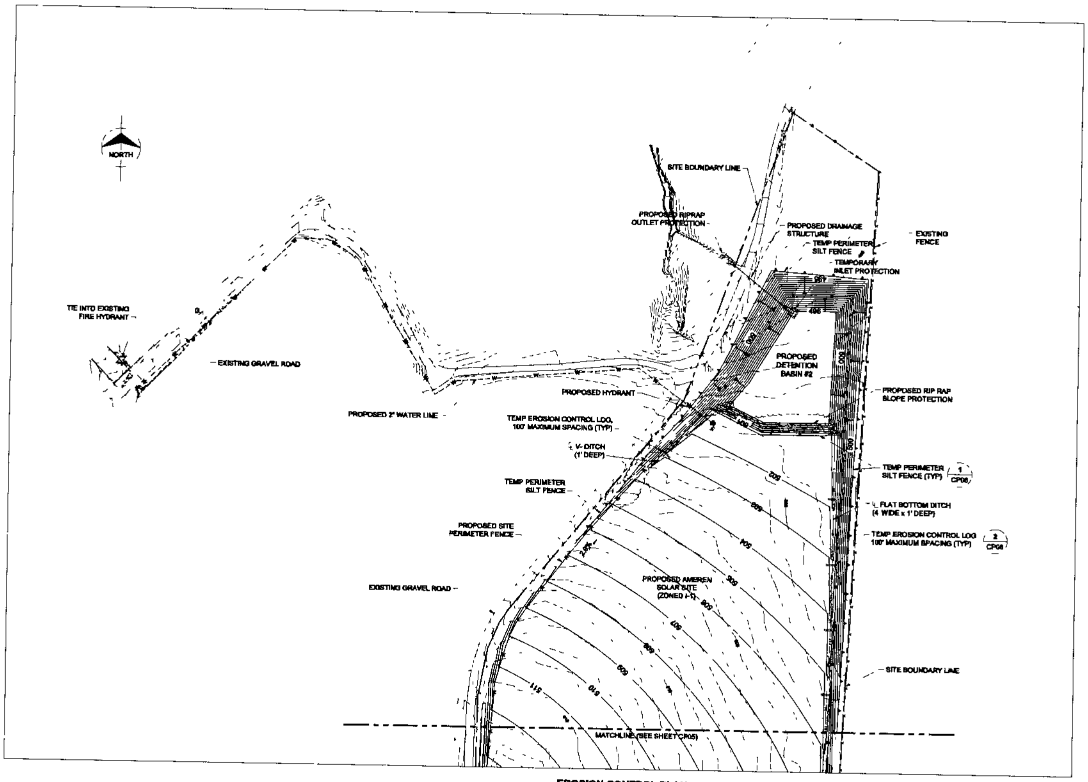
REV	PROJ ID	DATE	DRWN	RVW	APPD
A		04-17 18	CAH	MRH	

ISSUED FOR 90% REVIEW

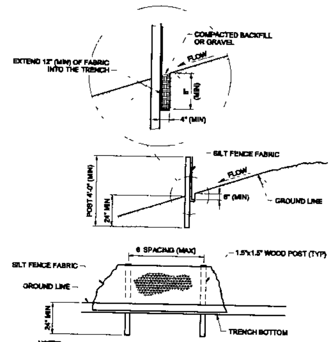
Ameren MISSOURI

CP06

SCALE RATIO

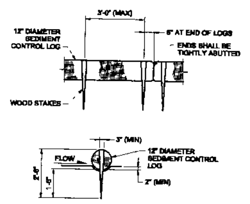


EROSION CONTROL PLAN



NOTES
1. MINIMUM LONGITUDINAL SPLICE OVERLAP SHALL BE 2' WITH A POST AT EACH END. SECURE FABRIC TO POSTS.
2. COMPACTION OF ANCHOR TRENCH SHALL BE SUCH THAT SILT FENCE RESISTS BEING PULLED OUT OF THE TRENCH BY HAND.
3. FABRIC SHALL BE FASTENED SECURELY TO THE POSTS USING A MINIMUM OF ONE INCH LONG, HEAVY DUTY STAPLES OR TIE WIRES.
4. REMOVE SEDIMENT FENCE AFTER IT HAS SERVED ITS USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.

TEMP PERIMETER SILT FENCE (1 / CP05 / CP06)
NOT TO SCALE



NOTES
1. SEDIMENT CONTROL LOGS SHALL CONSIST OF STRAW, COMPOST, EXCELSIOR, OR COCONUT FIBER.
2. THE SEDIMENT CONTROL LOG SHALL BE TRENCHED INTO THE GROUND A MINIMUM OF 2".

TEMP EROSION CONTROL LOG (2 / CP05 / CP06)
NOT TO SCALE

PRELIMINARY - NOT FOR CONSTRUCTION

0 60' 120'
SCALE IN FEET

BMCD# 77051

REV	PROJ ID	DATE	DRWN	CHK	APPD
A		04-17-14	CAH		

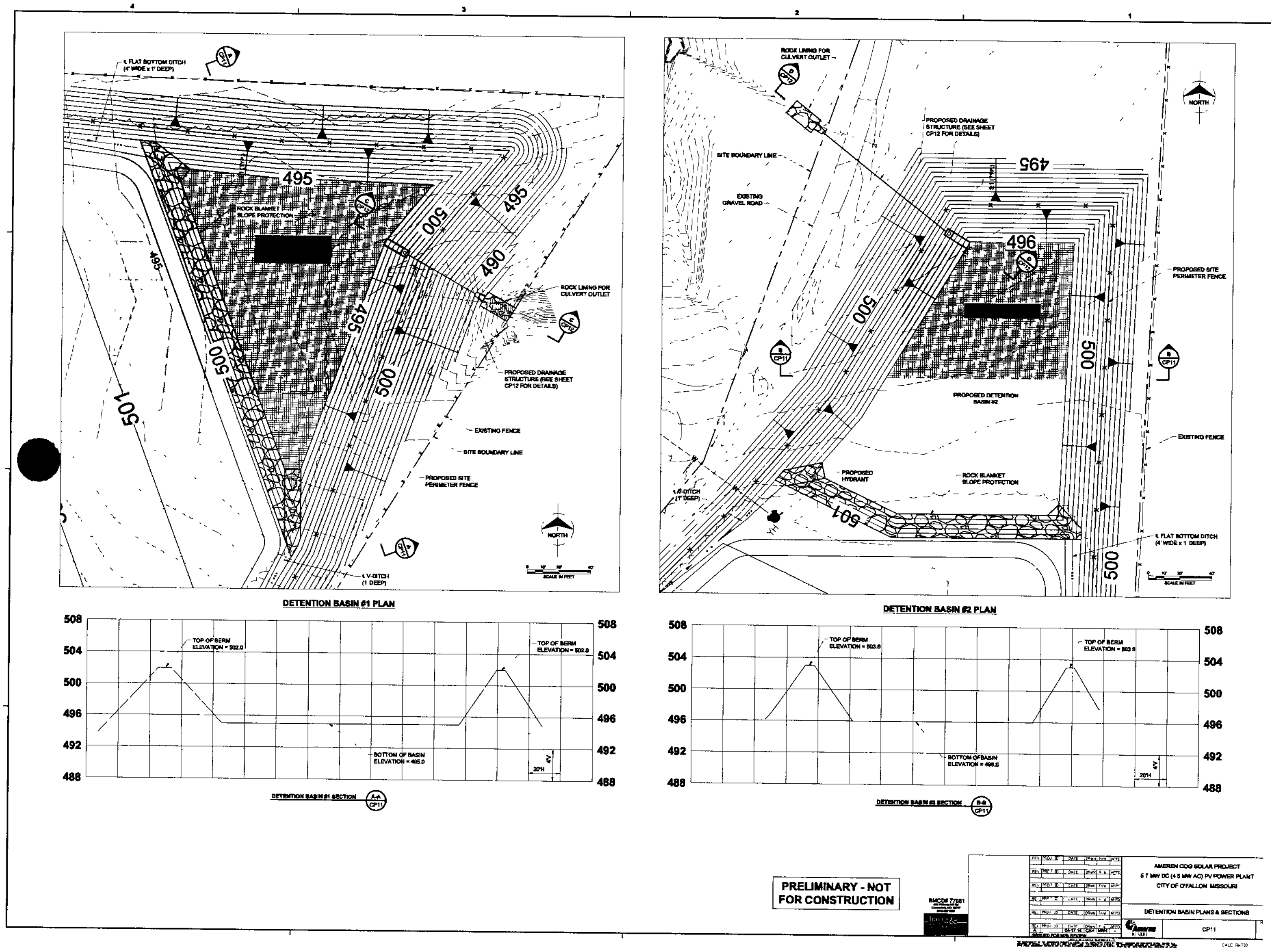
ISSUED FOR 60% REVIEW

AMEREN COG SOLAR PROJECT
5.7 MW DC (4.5 MW AC) PV POWER PLANT
CITY OF O'FALLON, MISSOURI

EROSION CONTROL PLAN

Ameren MISSOURI

CP06



℄ FLAT BOTTOM DITCH (4' WIDE x 1' DEEP)
ROCK BLANKET SLOPE PROTECTION
ROCK LINING FOR CULVERT OUTLET
PROPOSED DRAINAGE STRUCTURE (SEE SHEET CP12 FOR DETAILS)
EXISTING FENCE
SITE BOUNDARY LINE
PROPOSED SITE PERIMETER FENCE
℄ V-DITCH (1' DEEP)
NORTH
SCALE IN FEET
DETENTION BASIN #1 PLAN
TOP OF BERM ELEVATION = 502.0
BOTTOM OF BASIN ELEVATION = 495.0
DETENTION BASIN #1 SECTION
A-A CP11
EXISTING GRAVEL ROAD
PROPOSED DETENTION BASIN #2
PROPOSED HYDRANT
DETENTION BASIN #2 PLAN
TOP OF BERM ELEVATION = 503.0
BOTTOM OF BASIN ELEVATION = 496.0
DETENTION BASIN #2 SECTION
B-B CP11
PRELIMINARY - NOT FOR CONSTRUCTION
BMCD# 77051
AMEREN COG SOLAR PROJECT
5.7 MW DC (4.5 MW AC) PV POWER PLANT
CITY OF O'FALLON MISSOURI
DETENTION BASIN PLANS & SECTIONS
CP11
ISSUED FOR 90% REVIEW

APPENDIX C – BMP DETAILS

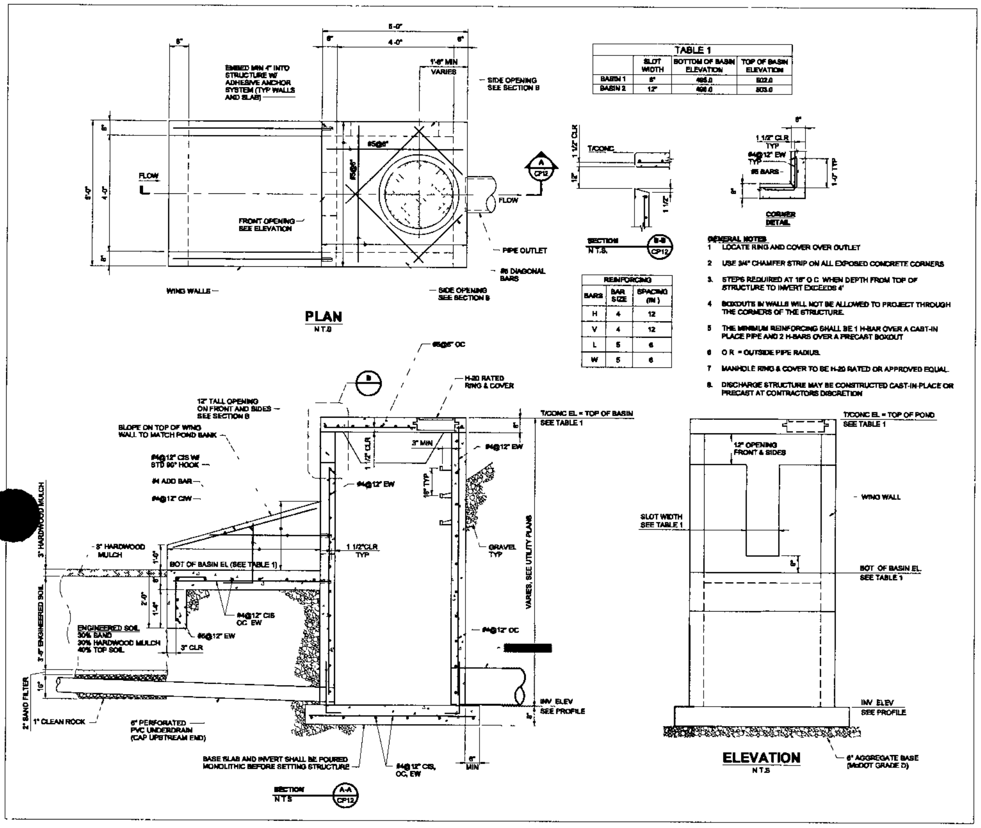


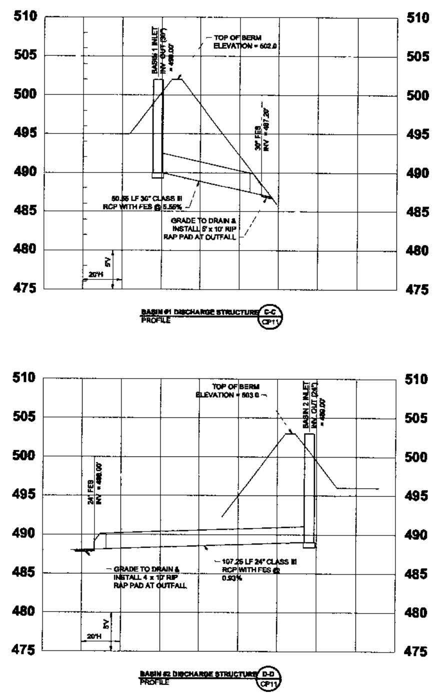
TABLE 1			
	SLOT WIDTH	BOTTOM OF BASIN ELEVATION	TOP OF BASIN ELEVATION
BASIN 1	6"	495.0	502.0
BASIN 2	12"	490.0	503.0

REINFORCING		
BARS	BAR SIZE	SPACING (IN.)
H	4	12
V	4	12
L	5	6
W	5	6

GENERAL NOTES

1. LOCATE RING AND COVER OVER OUTLET
2. USE 3/4" CHAMFER STRIP ON ALL EXPOSED CONCRETE CORNERS
3. STEPS REQUIRED AT 16" O.C. WHEN DEPTH FROM TOP OF STRUCTURE TO INVERT EXCEEDS 4'
4. BOXOUTS IN WALLS WILL NOT BE ALLOWED TO PROJECT THROUGH THE CORNERS OF THE STRUCTURE.
5. THE MINIMUM REINFORCING SHALL BE 1 H-BAR OVER A CAST-IN PLACE PIPE AND 2 H-BARS OVER A PRECAST BOXOUT
6. O.R. = OUTSIDE PIPE RADIUS.
7. MANHOLE RING & COVER TO BE H-20 RATED OR APPROVED EQUAL.
8. DISCHARGE STRUCTURE MAY BE CONSTRUCTED CAST-IN-PLACE OR PRECAST AT CONTRACTORS DISCRETION

BASIN DISCHARGE STRUCTURE DETAILS



PRELIMINARY - NOT FOR CONSTRUCTION

BMCD# 77051

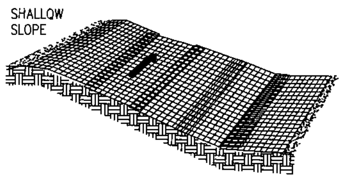
AMEREN COG SOLAR PROJECT
5.7 MW DC (4.5 MW AC) PV POWER PLANT
CITY OF O'FALLON MISSOURI

DETENTION BASIN DETAILS

CP12

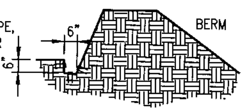
ISSUED FOR 60% REVIEW

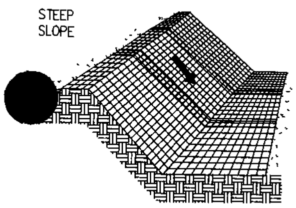
EROSION CONTROL BLANKET



NOTE:
ON SHALLOW SLOPES, PROTECTIVE EROSION CONTROL BLANKETS MAY BE APPLIED ACROSS THE SLOPE

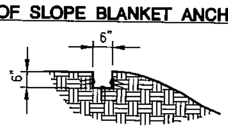
NOTE:
WHERE THERE IS A BERM AT THE TOP OF THE SLOPE, BRING THE MATERIAL OVER THE BERM AND ANCHOR IT BEHIND THE BERM



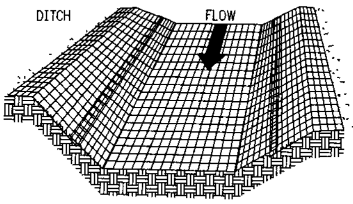


NOTE:
ON STEEP SLOPES, APPLY PROTECTIVE BLANKET PERPENDICULAR TO THE DIRECTION OF FLOW AND ANCHOR SECURELY

TOP OF SLOPE BLANKET ANCHOR SLOT



NOTE:
BRING MATERIAL DOWN TO A LEVEL AREA BEFORE TERMINATING THE INSTALLATION



NOTE:
IN DITCHES, APPLY PROTECTIVE COVERING PARALLEL TO THE DIRECTION OF FLOW USE CHECK SLOTS AS REQUIRED AVOID JOINING MATERIAL IN THE CENTER OF THE DITCH IF AT ALL POSSIBLE FOLLOW BLANKET MANUFACTURER'S RECOMMENDATIONS FOR ALLOWABLE VELOCITY AND SHEAR STRESS.

SOURCE. MODIFIED FROM VA DCR, 1992

EROSION CONTROL BLANKET NOTES (1 OF 2):

A) SITE PREPARATION:

AFTER SITE HAS BEEN SHAPED AND GRADED, PREPARE A FRIABLE SEEDBED RELATIVELY FREE FROM CLODS AND ROCKS MORE THAN 1 1/2 INCHES IN DIAMETER AND ANY FOREIGN MATERIAL THAT WILL PREVENT UNIFORM CONTACT OF THE PROTECTIVE COVERING WITH THE SOIL SURFACE

B) PLANTING:

LIME, FERTILIZE, AND SEED IN ACCORDANCE WITH SEEDING OR PLANTING PLAN WHEN USING JUTE MESH ON A SEEDED AREA, APPLY APPROXIMATELY ONE HALF THE SEED AFTER LAYING THE MAT THE PROTECTIVE COVERING CAN BE LAID OVER SPRIGGED AREAS WHERE SMALL GRASS PLANTS HAVE BEEN INSERTED INTO THE SOIL WHERE GROUND COVERS ARE TO BE PLANTED, LAY THE PROTECTIVE COVERING FIRST AND THEN PLANT THROUGH THE MATERIAL AS PER PLANTING PLAN

C) LAYING AND STAPLING:

IF INSTRUCTIONS HAVE BEEN FOLLOWED, ALL NEEDED CHECK SLOTS WILL HAVE BEEN INSTALLED, AND THE PROTECTIVE COVERING WILL BE LAID ON A FRIABLE SEEDBED FREE FROM CLODS, ROCKS, ROOTS, ETC THAT MIGHT IMPEDE GOOD CONTACT

1. START LAYING THE PROTECTIVE COVERING FROM THE TOP OF THE CHANNEL OR SLOPE AND UNROLL DOWN-GRADE ALLOW TO LAY LOOSELY ON SOIL, DO NOT STRETCH
2. UPSLOPE ENDS OF THE BLANKET SHOULD BE BURIED IN AN ANCHOR SLOT NO LESS THAN 6-INCHES DEEP TAMP EARTH FIRMLY OVER THE MATERIAL WHEN TOP IS RELATIVELY FLAT, EXTEND BLANKET ABOUT 40 INCHES AWAY FROM SLOPE STAPLE THE MATERIAL AT A MINIMUM OF EVERY 12 INCHES ACROSS THE TOP END
3. EDGES OF THE MATERIAL SHALL BE STAPLED EVERY 3 FEET WHERE MULTIPLE WIDTHS ARE LAID SIDE BY SIDE, THE ADJACENT EDGES SHALL BE OVERLAPPED A MINIMUM OF 6 INCHES AND STAPLED TOGETHER
4. STAPLES SHALL BE PLACED DOWN THE CENTER, STAGGERED WITH THE EDGES AT 3-FOOT INTERVALS

D) TROUBLESHOOTING:

CONSULT WITH A QUALIFIED DESIGN PROFESSIONAL, IF ANY OF THE FOLLOWING OCCUR

1. MOVEMENT OF THE BLANKET OR EROSION UNDER THE BLANKET IS OBSERVED
2. VARIATIONS IN TOPOGRAPHY ON SITE INDICATE EROSION CONTROL MAT WILL NOT FUNCTION AS INTENDED, CHANGES IN PLAN MAY BE NEEDED, OR A BLANKET WITH A SHORTER OR LONGER LIFE MAY BE NEEDED
3. DESIGN SPECIFICATIONS FOR SEED VARIETY, SEEDING DATES, OR EROSION CONTROL MATERIALS CANNOT BE MET, SUBSTITUTION MAY BE REQUIRED UNAPPROVED SUBSTITUTIONS COULD RESULT IN FAILURE TO ESTABLISH VEGETATION

E) MAINTENANCE & INSPECTION

INSPECT CONTROLS AFTER EACH RAIN EVENT OF 1/2 INCH OR GREATER, AND EVERY 7 DAYS UNTIL VEGETATION IS ESTABLISHED, FOR EROSION OR UNDERMINING BENEATH THE NETTING, BLANKETS, OR MATS IF ANY AREA SHOWS EROSION, PULL BACK THAT PORTION OF THE MATERIAL, ADD SOIL, TAMP DOWN, AND RESEED, RESECURE THE MATERIAL IN PLACE IF NETTING, BLANKETS OR MATS BECOME DISLOCATED OR DAMAGED, REPAIR OR REPLACE AND RESECURE IMMEDIATELY

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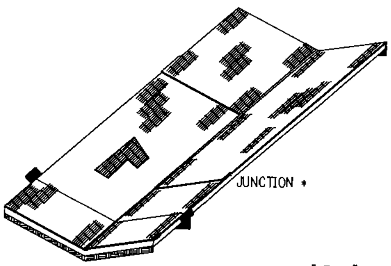
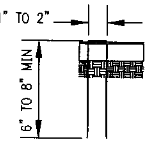
APWA	KANSAS CITY METROPOLITAN CHAPTER
EROSION CONTROL BLANKET SHEET 1 OF 2	STANDARD DRAWING NUMBER ESC-04 ADOPTED:

EROSION CONTROL BLANKET INSTALLATION FOR CHANNELS

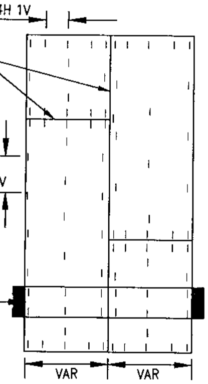


NOTE
* JUNCTION OVERLAP TOP BLANKET 6 INCHES MINIMUM AND STAPLE EVERY 6 INCHES ACROSS



NOT TO SCALE

NOTE
STAPLE FORMED FROM NO 11 STEEL WIRE
MIN 8" STAPLE LENGTH FOR SANDY SOIL
MIN 6" STAPLE LENGTH FOR OTHER SOIL

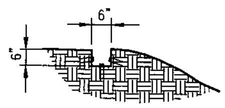


PLAN VIEW STAPLING DIAGRAM

NOT TO SCALE

NOTE
* CHECK SLOTS AT MIN 50' INTERVALS, NOT REQUIRED WITH ALL COMBINATION BLANKETS

NOTE
APPROXIMATELY 200 STAPLES ARE REQUIRED PER 100 SQ YDS OF MATERIAL ROLL ANCHOR SLOTS, JUNCTION SLOTS, AND CHECK SLOTS TO BE BURIED 6" TO 12" DEEP



ANCHOR SLOT

EROSION CONTROL BLANKET NOTES (2 OF 2):

F) STAPLES:

STAPLES FOR ANCHORING BLANKET SHALL BE NO 11-GAUGE WIRE OR HEAVIER THEIR LENGTH SHALL BE A MINIMUM OF 6 INCHES. A LARGER STAPLE WITH A LENGTH OF UP TO 12 INCHES SHALL BE USED ON LOOSE, SANDY, OR UNSTABLE SOILS

G) JOINING PREOTECTIVE COVERINGS:

OVERLAP THE END OF THE PREVIOUS ROLL A MINIMUM OF 6 INCHES AND STAPLE STAPLE ACROSS THE END OF THE ROLL JUST BELOW THE ANCHOR SLOT AND ACROSS THE MATERIAL EVERY 6 INCHES

H) TERMINAL END:

AT THE POINT AT WHICH THE MATERIAL IS DISCONTINUED, OR WHERE THE PROTECTIVE COVERING MEETS A STRUCTURE OF SOME TYPE, STAPLE A MINIMUM OF EVERY 12 INCHES

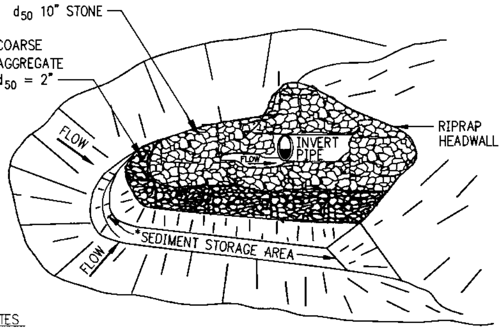
I) FINAL CHECK:

THESE INSTALLATION CRITERIA MUST BE ADHERED TO
1 ALL DISTURBED AREAS ARE SEEDED
2 PROTECTIVE BLANKET IS IN UNIFORM CONTACT WITH THE SOIL
3 ALL LAP JOINTS ARE SECURE
4 ALL STAPLES ARE DRIVEN FLUSH WITH THE GROUND

SOURCE MODIFIED FROM VA DCR, 1992

AMERICAN PUBLIC WORKS ASSOCIATION	
APWA	KANSAS CITY METROPOLITAN CHAPTER
EROSION CONTROL BLANKET SHEET 2 OF 2	STANDARD DRAWING NUMBER ESC-05 ADOPTED

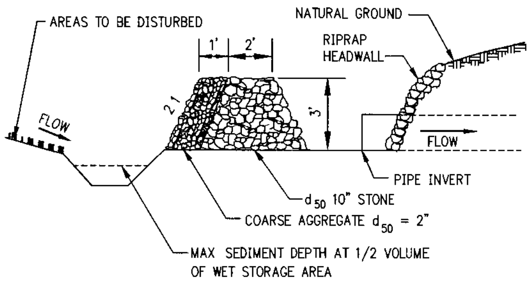
CULVERT INLET SEDIMENT TRAP



NOTES:

1. STORAGE REQUIREMENTS EQUIVALENT TO THAT OF TEMPORARY SEDIMENT TRAP.
2. 67 C.Y./ACRE WET STORAGE BELOW BASE OF STONE
3. 67 C.Y./ACRE DRY STORAGE FROM BASE OF STONE TO TOP OF STONE BERM

PERSPECTIVE VIEW



ELEVATION

NOT TO SCALE

SOURCE: MODIFIED FROM VA. DCR, 1992

CULVERT INLET SEDIMENT TRAP NOTES:

A) CONSTRUCTION SPECIFICATIONS:

1. GEOMETRY OF THE DESIGN WILL BE A HORSESHOE SHAPE AROUND THE CULVERT INLET.
2. THE TOE OF RIPRAP SHALL BE NO CLOSER THAN 24" FROM THE CULVERT OPENING TO PROVIDE AN ACCEPTABLE EMERGENCY OUTLET FOR FLOWS FROM LARGER STORM EVENTS.
3. ALL CONSTRUCTION SPECIFICATIONS FOUND WITHIN TEMPORARY SEDIMENT TRAP SPECIFICATIONS APPLY TO THIS PRACTICE.
4. THE PROPER INSTALLATION OF THE CULVERT INLET SEDIMENT TRAP IS A VIABLE SUBSTITUTE FOR THE INSTALLATION OF THE TEMPORARY SEDIMENT TRAP.

B) INSPECTION AND MAINTENANCE:

1. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN EVENT OF 1/2-INCH OR GREATER, AND REPAIRS SHALL BE MADE AS NEEDED.
2. AGGREGATE SHALL BE REPLACED OR CLEANED WHEN INSPECTION REVEALS THAT CLOGGED VOIDS ARE CAUSING PONDING PROBLEMS WHICH INTERFERE WITH ON-SITE CONSTRUCTION.
3. SEDIMENT SHALL BE REMOVED AND THE IMPOUNDMENT RESTORED TO ITS ORIGINAL DIMENSIONS WHEN SEDIMENT HAS ACCUMULATED TO ONE HALF THE DESIGN DEPTH. REMOVED SEDIMENT SHALL BE DEPOSITED IN A SUITABLE AREA SO THAT IT WILL NOT ERODE AND CAUSE SEDIMENTATION PROBLEMS.
4. TEMPORARY STRUCTURES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED.

C) GENERAL GUIDELINES:

1. THE INLET PROTECTION DEVICE SHALL BE CONSTRUCTED IN A MANNER THAT WILL FACILITATE CLEAN-OUT AND DISPOSAL OF TRAPPED SEDIMENT AND MINIMIZE INTERFERENCE WITH CONSTRUCTION ACTIVITIES.
2. THE INLET PROTECTION DEVICES SHALL BE CONSTRUCTED IN SUCH A MANNER THAT ANY RESULTANT PONDING STORMWATER WILL NOT CAUSE EXCESSIVE INCONVENIENCE OR DAMAGE TO ADJACENT AREAS OR STRUCTURES.

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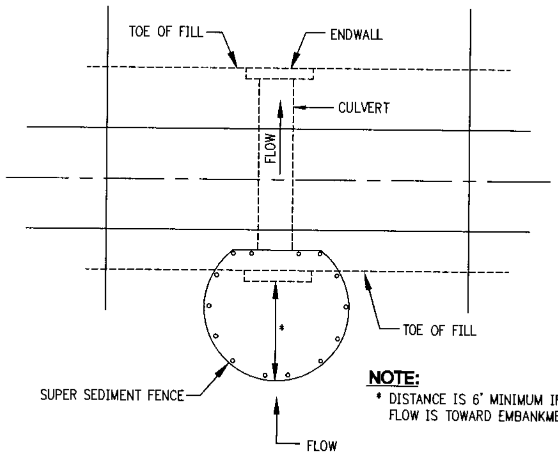
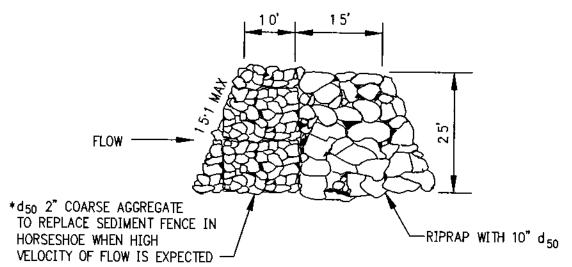
CULVERT INLET SEDIMENT TRAP	STANDARD DRAWING NUMBER: ESC-27 ADOPTED:

SEDIMENT FENCE CULVERT INLET PROTECTION



NOTE:
* DISTANCE IS 6' MINIMUM IF FLOW IS TOWARD EMBANKMENT



***OPTIONAL STONE COMBINATION**
NOT TO SCALE

SOURCE. MODIFIED FROM VA DCR, 1992

SEDIMENT FENCE CULVERT INLET PROTECTION NOTES:

A) GENERAL NOTES:

1. THE INLET PROTECTION DEVICE SHALL BE CONSTRUCTED IN A MANNER THAT WILL FACILITATE CLEAN-OUT AND DISPOSAL OF TRAPPED SEDIMENT AND MINIMIZE INTERFERENCE WITH CONSTRUCTION ACTIVITIES
2. THE INLET PROTECTION DEVICES SHALL BE CONSTRUCTED IN SUCH A MANNER THAT ANY RESULTANT PONDING STORMWATER WILL NOT CAUSE EXCESSIVE INCONVIENCE OR DAMAGE TO ADJACENT AREAS OR STRUCTURES
3. DESIGN CRITERIA MORE SPECIFIC TO EACH PARTICULAR INLET PROTECTION DEVICE ARE FOUND IN SECTION 5108.8

B) SUPER SEDIMENT FENCE INSTALLATION NOTES:

1. THE HEIGHT OF A SEDIMENT FENCE SHALL BE A MINIMUM OF 16 INCHES ABOVE THE ORIGINAL GROUND SURFACE AND SHALL NOT EXCEED 34 INCHES ABOVE GROUND SURFACE
2. THE GEOTEXTILE SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE UNAVOIDABLE, GEOTEXTILE SHALL BE SPLICED TOGETHER AT A SUPPORT POST, WITH A MINIMUM 6-INCH OVERLAP, AND SECURELY SEALED
3. DIG A TRENCH AT LEAST 6 INCHES DEEP AND 4 INCHES WIDE ALONG THE FENCE ALIGNMENT
4. DRIVE POSTS AT LEAST 24 INCHES INTO THE GROUND ON THE DOWNSLOPE SIDE OF THE TRENCH. SPACE POSTS A MAXIMUM OF 6 FEET APART
5. EXTRA-STRENGTH SEDIMENT FENCE FABRIC SHALL BE USED. POSTS FOR THIS TYPE OF FABRIC SHALL BE PLACED A MAXIMUM OF 6 FEET APART. THE SEDIMENT FABRIC SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING MINIMUM ONE-INCH LONG HEAVY-DUTY WIRE STAPLES OR TIE WIRES, AND EIGHT INCHES OF THE FABRIC SHALL BE EXTENDED INTO THE TRENCH. THE FABRIC SHALL NOT BE STAPLED TO EXISTING TREES
6. PLACE THE BOTTOM 1 FOOT OF FABRIC IN THE 6-INCH DEEP TRENCH, LAPPING TOWARD THE UPSLOPE SIDE BACKFILL WITH COMPACTED EARTH OR GRAVEL
7. IF A SEDIMENT FENCE IS TO BE CONSTRUCTED ACROSS A DITCH LINE OR SWALE, IT MUST BE OF SUFFICIENT LENGTH TO ELIMINATE ENDFLOW, AND THE PLAN CONFIGURATION SHALL RESEMBLE AN ARC OR HORSESHOE WITH THE ENDS ORIENTED UPSLOPE. EXTRA-STRENGTH SEDIMENT FABRIC SHALL BE USED FOR THIS APPLICATION WITH A MAXIMUM 3-FOOT SPACING OF POSTS. ALL OTHER INSTALLATION REQUIREMENTS NOTED IN #5 APPLY
8. TO REDUCE MAINTENANCE, EXCAVATE A SHALLOW SEDIMENT STORAGE AREA ON THE UPSLOPE SIDE OF THE FENCE. PROVIDE GOOD ACCESS IN AREAS OF HEAVY SEDIMENTATION FOR CLEAN OUT AND MAINTENANCE
9. SEDIMENT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED

AMERICAN PUBLIC WORKS ASSOCIATION	
APWA	KANSAS CITY METROPOLITAN CHAPTER
SEDIMENT FENCE CULVERT INLET PROTECTION	STANDARD DRAWING NUMBER ESC-28 ADOPTED

Riprap Slope Protection

***Riprap slope protection** is an erosion control measure consisting of geotextile fabric and stone riprap that is placed on an unvegetated slope to protect the soil from erosive forces.*

Purpose

To protect slopes or similar areas subject to erosion by water.

Specifications

Slope

A ratio of 2:1 or flatter (designed by a qualified individual/professional engineer; slopes exceeding 2:1 may require additional design considerations).

Minimum Thickness

Two times the designed d_{50} (see Appendix A – Glossary) stone diameter plus the depth of the bedding material.

Materials

- Riprap
  - Hard, angular, and weather resistant.
  - Specific gravity of at least 2.5.
  - Size and gradation that will withstand velocities of storm water discharge flow design.
  - Well-graded mixture of stone with 50 percent of the stone pieces, by weight, larger than the designed d_{50} size.
  - Largest pieces should not exceed two times the designed d_{50} and no more than 15 percent of the pieces (by weight) should be less than three inches.

- Bedding Material – Geotextile fabric, sand, or crushed aggregate [Indiana Department of Transportation CA No. 9, 11, or 12 (see Appendix D)].

Installation

Subgrade Preparation

1. Remove brush, trees, stumps, and other debris and dispose of in designated areas.
2. Excavate foundation subgrade below design elevation to allow for thickness of the bedding material and riprap.
3. Compact any fill material to the density of the surrounding undisturbed soil.
4. Cut a keyway in stable material at the slope base to reinforce the toe; keyway depth should be one and one-half times the design thickness of the stone and should extend a horizontal distance equal to the design thickness (see Riprap Slope Protection Worksheet).
5. Smooth the graded foundation.

Placement of Bedding Material

1. If using geotextile fabric, place on the smoothed foundation, overlap the edges at least 12 inches and secure with anchor pins spaced every three feet along the overlap. (For large riprap, consider a four inch layer of sand to protect the fabric.)
2. If using sand or aggregate bedding material, spread the well-graded bedding material in a uniform layer to the required thickness (six inches minimum). If two or more layers are specified, place the layer of the smaller gradation first and avoid mixing the layers.

   Note: **Omission of the bedding material or damage to it may result in erosion and/or piping beneath the riprap or movement of the underlying soil through the voids in the riprap.**

Riprap Placement

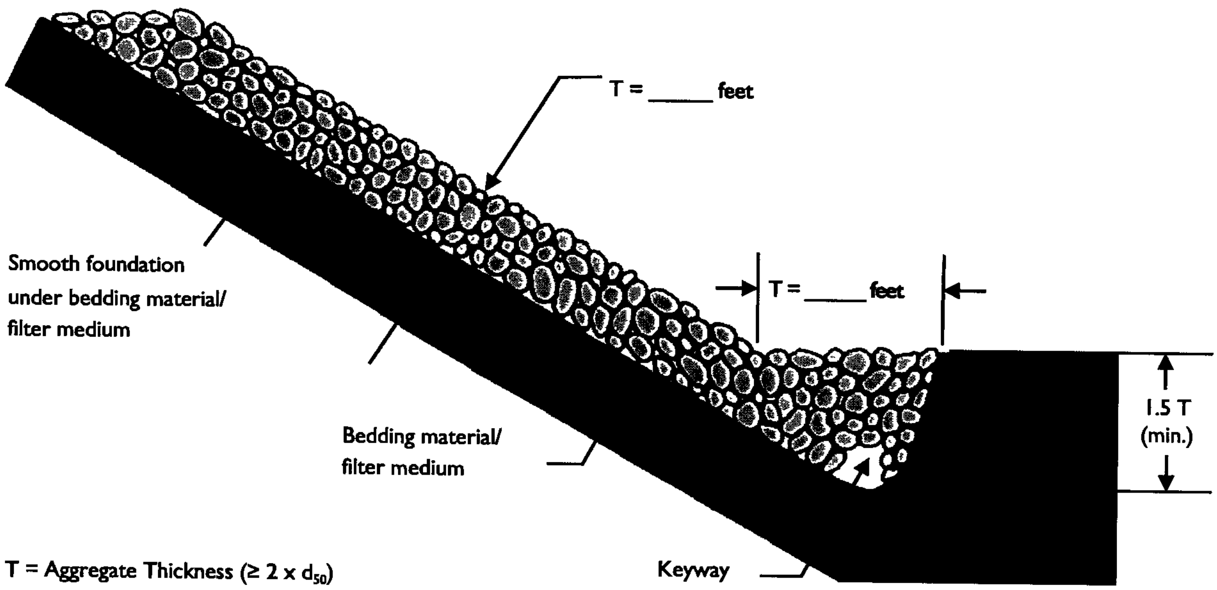
1. Immediately after installing the bedding material, add riprap to the lines and elevations shown in the construction plans. Place the riprap in one operation, taking care not to damage the bedding material. (Do not dump through chutes or use any method that causes segregation of stone sizes or that will dislodge or damage the underlying bedding material.)
2. If geotextile fabric tears when placing riprap, repair immediately by laying and stapling a piece of fabric over the damaged area, overlapping the undamaged areas by at least 12 inches.

3. Place smaller stone in voids to form a dense, uniform, well-graded riprap mass. (Selective loading at the quarry and some hand placement may be needed to ensure an even distribution of stone material.)
4. Blend the riprap surface smoothly with the surrounding area to eliminate protrusions or overfalls.

Maintenance

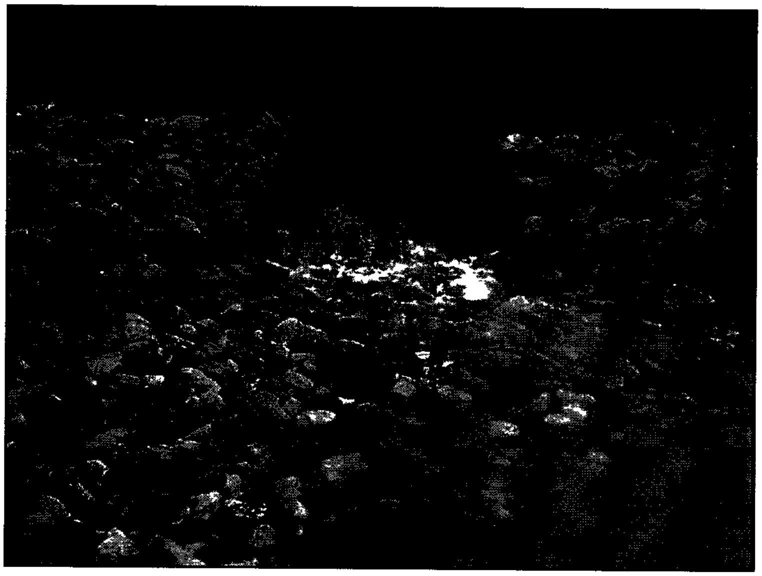
- Inspect within 24 hours of each rain event and at least once every seven calendar days.
- Check for displacement of riprap material, slumping, and erosion along the edges, especially on the down-slope side. (Properly designed and installed riprap usually requires very little maintenance.)

Riprap Slope Protection Worksheet



Source: Adapted from North Carolina Erosion and Sediment Control Planning and Design Manual, 1993

Energy Dissipater (Outlet Protection)



*An **energy dissipater (outlet protection)** is an erosion control measure consisting of riprap placed at the outlet end of culverts, conduits, channels, etc.*

Purpose

To prevent erosion at the outlet of a channel or conduit by reducing the velocity of storm water flow and dissipating its energy.

Specifications

Note: **Designed by a qualified individual/professional engineer. Additional design considerations will be required when discharge velocities are very high or tailwater conditions are very low.**

Capacity:

Peak runoff from a 10-year frequency, 24-hour storm event or the design discharge of the water conveyance structure, whichever is greater.

Maximum Velocity

Ten feet per second.

Tailwater Depth

- Determined immediately below the structure outlet.
- Based on design discharge plus other contributing flows.

Apron

- Length and width determined according to tailwater conditions.

- Aligned straight with channel flow. If a curve is necessary to align the apron with the receiving stream, locate the curve in the upstream section of the apron.
- Plunge pool (used with higher velocity flows).
- Thickness
  - 1.2 times the maximum stone diameter for a d_{50} stone size of 15 inches or larger.
  - 1.5 times the maximum stone diameter for a d_{50} stone size of 15 inches or less.

Table 1. Sizing for Flow Dissipaters at Culvert Pipe Outlets[1]

Pipe Size	Average Riprap Diameter	Apron Width[2]	Apron Length[3]
8 in.	3 in.	2 to 3 ft.	5 to 7 ft.
12 in.	5 in.	3 to 4 ft.	6 to 12 ft.
18 in.	8 in.	4 to 6 ft.	8 to 18 ft.
24 in.	10 in.	6 to 8 ft.	12 to 22 ft.
30 in.	12 in.	8 to 10 ft.	14 to 28 ft.
36 in.	14 in.	10 to 12 ft.	16 to 32 ft.

[1] For larger or higher flows consult a registered engineer.

[2] Apron width at the narrow end of apron (pipe or channel outlet).

[3] Select length taking into consideration the low flow (no pressure head) or high flow (pressure head) conditions of the culvert pipe.

Materials

- Riprap
  - Hard, angular, highly weather resistant.
  - Specific gravity of at least 2.5.
  - Size and gradation that will withstand velocities of storm water discharge flow design.
  - Well-graded mixture of stone with 50 percent of the stone pieces, by weight, larger than the d_{50} size and the diameter of the largest stone equal to 1.5 times the d_{50} size.

Note: **Concrete, gabion baskets, grouted riprap, interlocking concrete blocks, cabled concrete, and turf reinforcement products are alternative options to riprap.**

- Geotextile fabric or well-graded aggregate [INDOT CA No. 9, 11, or 12 (see Appendix D)].

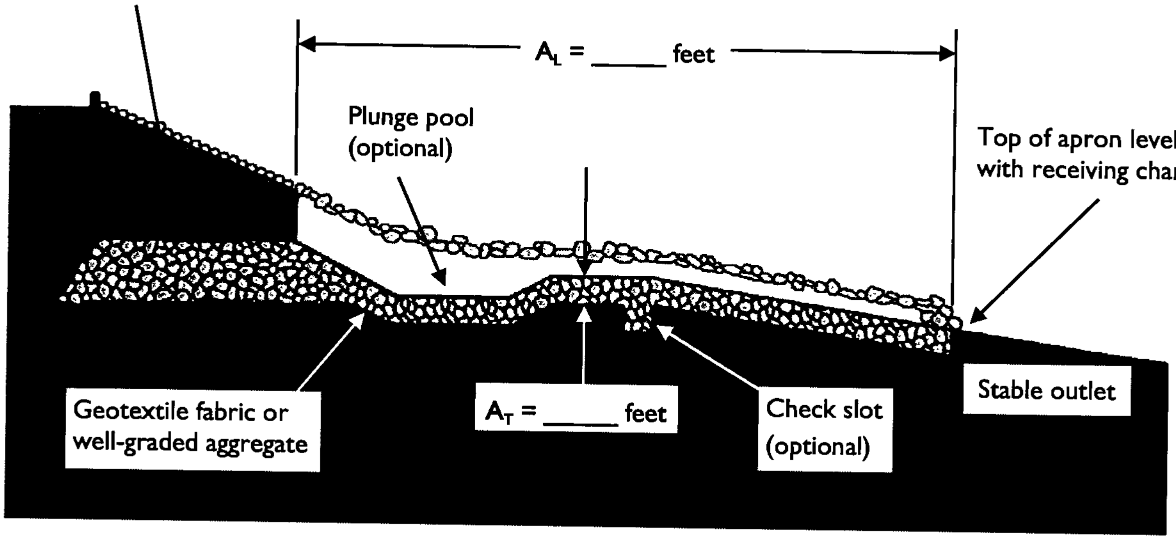
Installation

1. Divert surface water runoff around the structure during construction so that the site can be properly dewatered for foundation preparation.
2. Excavate foundation and apron area subgrades below design elevation to allow for thickness of the filter medium and riprap.
3. Compact any fill used in subgrade preparation to the density of surrounding undisturbed soil material.
4. Smooth subgrade enough to protect geotextile fabric from tearing.
5. Place geotextile fabric or aggregate bedding material (for stabilization and filtration) on the compacted and smoothed foundation.
6. Install riprap to the lines and elevations shown in the construction plans. Blend riprap smoothly to surrounding grade. If the channel is well defined, extend the apron across the channel bottom and up the channel banks to an elevation of six inches above the maximum tailwater depth or to the top of the bank, whichever is less.
7. If geotextile fabric tears when placing riprap, repair immediately by laying and stapling a piece of fabric over damaged area, overlapping the undamaged areas by at least 12 inches.
8. Construct a small plunge pool within the outlet apron. (Riprap aprons must be level with or slightly lower than the receiving channel and should not produce an overfall or restrict flow of the water conveyance structure.)

Maintenance

- Inspect within 24 hours of a rain event and at least once every seven calendar days.
- Inspect for stone displacement; replace stones ensuring placement at finished grade.
- Check for erosion or scouring around sides of the apron; repair immediately.
- Check for piping or undercutting; repair immediately.

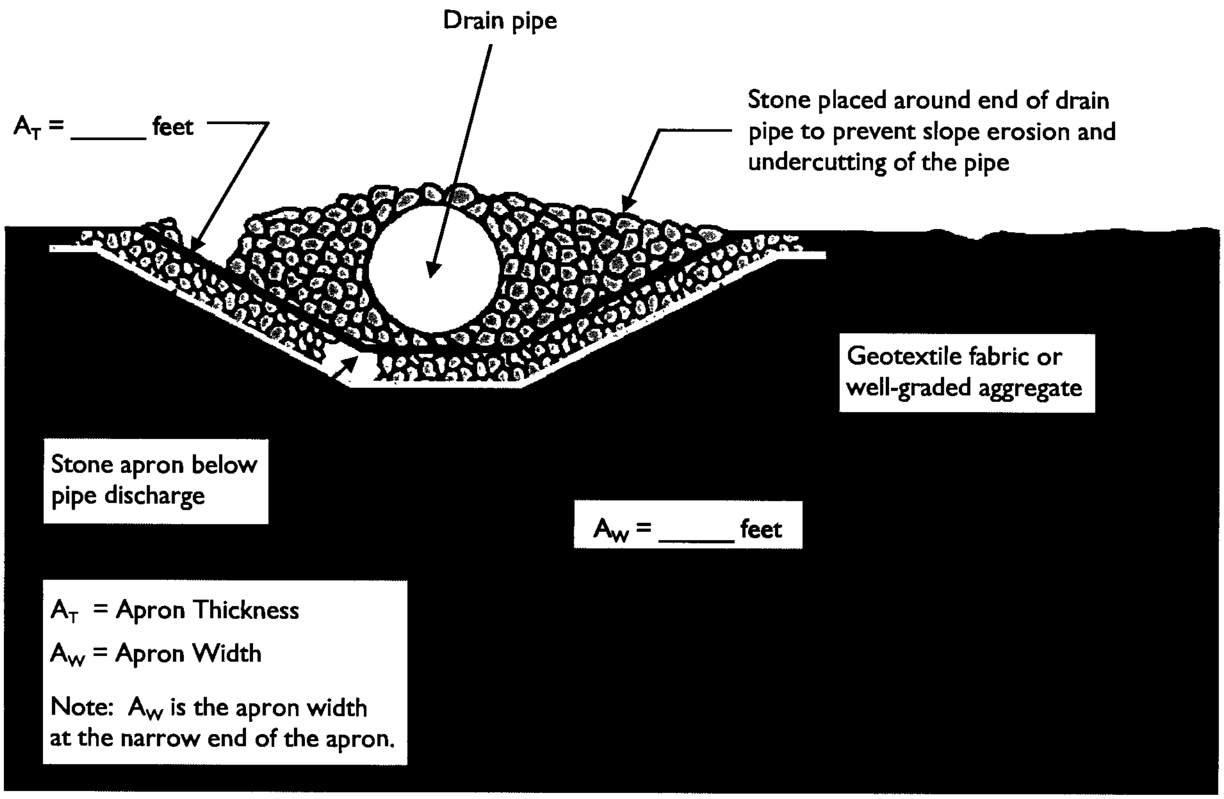
Energy Dissipater Worksheet 1



A_L = Apron Length

A_T = Apron Thickness

Energy Dissipater Worksheet 2



Filter Tube/Filter Sock

*A **filter tube/filter sock** is a temporary barrier consisting of permeable material (i.e., aggregate, compost, excelsior, or straw, etc.) contained in a permeable geotextile fabric or non-biodegradable net matrix installed to intercept and treat sediment-laden runoff from small, unvegetated drainage areas.*

Purpose

To trap sediment by intercepting runoff and reducing the velocity of sheet flow or concentrated flow (limited application). Filter socks capture sediment by ponding water to allow settling and deposition.

Note: **A filter sock, unlike a filter ridge, may be used as a diversion and across shallow swales where concentrated flow is anticipated.**

Specifications

Drainage Area

- Limited to one-quarter acre per 100 linear feet of barrier.
- Further restricted by slope steepness.

Table 1. Filter Sock Size Requirements, Sheet Flow Application

Slope		**Maximum Distance Above Filter Sock** (linear feet) **for Minimum Filter Sock Sizes** (diameter of sock)			
		8 inch	12 inch	18 inch	24 inch
0% – 2%	< 50:1	125	250	300	350
2% – 10%	50:1 to 10:1	100	125	200	250
10% – 20%	10:1 to 5:1	75	100	150	200
20% – 33%	5:1 to 3:1	25	50	75	100
> 33%	> 3:1	10	25	50	75

Location

- Slope Application
  - Installed on the contour.
  - Five to 10 feet from toe of slope (10 feet preferred).
- Channel/Swale Application
  - Perpendicular to channel flow.
  - Less than one acre of drainage area.
  - Utilize larger product, typically 18 or more inches.
- Drop Inlet Protection
  - Refer to standards and principles contained in the **Temporary Drop Inlet Protection** section on page 143.
- Accessible for maintenance (removal of sediment and replacement if needed.

Materials

- Geotextile fabric sock or a non-biodegradable netting matrix.
- Specifications for permeable material:

Compost/Mulch Specifications

- Feedstocks may include, but are not limited to, well-composted vegetable matter, leaves, yard trimmings, food scraps, composted manures, paper fiber, wood bark, Class A biosolids (as defined in federal regulations 40 CFR Part 503), or any combination thereof.
- Compost shall be produced using an aerobic composting process meeting CFR 503 regulations, including time and temperature data indicating effective weed seed, pathogen and insect larvae kill.
- Compost shall be well decomposed, stable, and weed free.
- Variable particle size with maximum dimensions of two inches in length, one-half inch in width, and one-half inch in depth.

Table 2. Compost Particle Size

Percent Passing Sieve Size			
2-Inch Sieve	1-Inch Sieve	¾-Inch Sieve	¼-Inch Sieve
100%	99%	70%	25%

- Refuse free (less than one percent by weight).
- Free of any contaminants and materials toxic to plant growth.
- Inert materials not to exceed one percent by dry weight.
- pH of 5.5 to 8.0.
- Carbon-nitrogen ratio not to exceed 100.

- Moisture content not to exceed 45 percent by dry weight.

Aggregate Specification

- INDOT CA No. 5 or No. 8 aggregate.

Straw, Excelsior, etc. Specification

- Premanufactured.

Anchoring Method

- Posts - 2 x 2 inch hardwood or steel posts.

Bonding Agents (optional)

Tackifiers, flocculants, or microbial additives may be used to remove sediment and/or additional pollutants from storm water runoff. (All additives combined with compost materials should be tested for physical results at a certified erosion and sediment control laboratory and biologically tested for elevated beneficial microorganisms at a United States Compost Council, Seal of Testing Assurance approved testing laboratory.)

Installation

1. Lay out the location of the filter sock barrier so that it is parallel to the contour of the slope and at least 10 feet beyond the toe of the slope to provide a sediment storage area. Turn the ends of the filter sock barrier up slope such that the point of contact between the ground and the bottom of the filter sock barrier end terminates at a higher elevation than the top of the filter sock barrier at its lowest point.
2. Excavate a trench with a depth and width equal to at least one-fourth the diameter of the filter sock or follow the manufacturer's recommendations. Where applicable, the trench may also be excavated upslope of a curb or sidewalk. Placing the product against the curb or sidewalk will provide additional stability and resistance to surface flow.
3. Construct the filter sock or utilize a pre-manufactured product. For compost use a pneumatic blower or similar device to provide adequate and consistent fill in the sock. (Seed or sod may be applied at the time of installation for permanent applications.)
4. If more than one sock is placed in a row, the socks should be overlapped; not abutted.
5. Anchor the filter sock barrier in place by driving posts through the barrier and into the underlying soil material. Posts should be spaced no more than five feet apart and driven through the middle of the sock. The posts should

be driven a minimum of 18 inches deep into the soil. The stake should be flush with the top of the sock.

6. Backfill the trench with excavated soil placed against the filter sock barrier to ground level on the down-slope side and to two inches above ground level on the up-slope side of the filter sock barrier. Compact the fill material to keep it in place.

Options for Installation

- These products may be placed in a series on the contour at intervals on a slope.
  - Follow the manufacturer's recommendations for this application, including spacing and diameter of product.
  - This application will require careful layout and installation. Alternatives, including immediate stabilization, should be considered as the first alternative. This application also requires extensive maintenance and daily inspections.
  - Typical applications include:
    - Slopes less than 20 percent (5:1). Place socks at a maximum interval of 20 feet (a closer spacing is more effective).
    - Slopes between 20 percent (5:1) and less than 50 percent (2:1). Place socks at a maximum interval of 15 feet (a closer spacing is more effective).
    - Slopes greater than 50 percent (2:1). Place socks at a maximum interval of 10 feet (a closer spacing is more effective).

Maintenance

- Inspect within 24 hours of a rain event and at least once every seven calendar days. When installed in a series at intervals on a slope, inspection should be done daily.
- Remove accumulated sediment when it reaches one-quarter the height of the filter sock.
- Inspect to ensure that the sock is maintaining its integrity and producing adequate flow.
- Repair eroded and damaged areas.
- If ponding becomes excessive, socks should be removed and either reconstructed or new product installed.
- Reseed, if applicable.
- If the filter sock is not designed as a permanent filter or part of the natural landscape and the contributing drainage area has been stabilized, use a blade or knife to cut open sock and use a bulldozer, loader, rake, or other device to incorporate the organic material into the soil, or spread it over the top of the soil surface for final seeding. Remove and dispose of sock if necessary.

APPENDIX D – INSPECTION AND MAINTENANCE

Ameren Belleau Solar Project
Stormwater Pollution Prevention Plan

INSPECTION AND MAINTENANCE REPORT FORM
(Permit No. MORA00000)

Name of Permittee: Ameren Missouri

Construction Site Name: Ameren Belleau Solar Project

Inspector: ______________________ Date: ________ Time: __________________

Present Phase of Construction: ______________________________________

Site Conditions: ____

Inspection Event:

☐ ROUTINE EVERY 14 DAYS
☐ RAIN EVENT　　RAINFALL (record all events > 0.5 inches): inches
☐ OTHER　　EXPLANATION: ____________________

Measures & Controls	Location	In Conformance with Typical Standard	Effective Pollutant Control Practice
Filter Socks		☐ YES ☐ NO	☐ YES ☐ NO
Silt Fence		☐ YES ☐ NO	☐ YES ☐ NO
Inlet Protection		☐ YES ☐ NO	☐ YES ☐ NO
Outlet Protection		☐ YES ☐ NO	☐ YES ☐ NO
Sediment Basins		☐ YES ☐ NO	☐ YES ☐ NO
Slope Protection			
Stabilization Measures		☐ YES ☐ NO	☐ YES ☐ NO

NON-CONFORMANCE/INEFFECTIVE POLLUTANT CONTROL PRACTICES NOTED DURING INSPECTION: (Explain each "NO" circled above)

RECOMMENDED REMEDIAL ACTIONS AND SCHEDULE OF THOSE EVENTS:

LIST OF AREAS WHERE LAND DISTURBANCE OPERATIONS HAVE PERMANENTLY OR TEMPORARILY STOPPED:

ADDITIONAL COMMENTS:

Signature:____ Printed Name: ____________________________

Environmental Inspector

LAND DISTURBANCE WEEKLY CHECKLIST
City of O'Fallon
Public Works Department
Stormwater Management
100 North Main Street, O'Fallon, MO 63366, 636.240.2000, fax: 636.379.7638

This form is to be filled out weekly, and after a 1/2" rain event within 24 hours. This form is to be emailed on a weekly basis to the Stormwater Management Coordinator, at micheleg@ofallon.mo.us on Monday morning of every week.
If you do not have access to email, please fax to 636.379.7638

Week Ending:____________________(Saturday)

Project:____
Contractor:______________________________________
Inspected By:____________________________Phone:____________________________

Select one:

____Weekly Inspection

____Post Event

Site Observations:

	Satisfactory	Deficient	Replace	Not Applicable
Perimeter Protection	______	______	______	______
Stock Piles Stabilized	______	______	______	______
Sediment Control for Disturbed Areas	______	______	______	______
Ditch Checks	______	______	______	______
Diversion Channels	______	______	______	______
Inlet Protection	______	______	______	______
Sediment Basins/Traps	______	______	______	______
Erosion at Discharge Points	______	______	______	______
Creek Degradation	______	______	______	______
Vegetative Cover	______	______	______	______
Filter Strips, Level Spreaders	______	______	______	______
Wash-off Operation	______	______	______	______
Nuisance Control	______	______	______	______
Other:	______	______	______	______
Other:	______	______	______	______
Other:	______	______	______	______

(Attach Additional Sheets if Necessary)

Areas where land disturbance activites took place:

____

____

List problem areas and corrective steps taken:

____

____

____

Inspector's signature:__________________________________ **Date:**_______________

APPENDIX E – SPILL REPORTING

Procedures for Determining if a Hazardous Material Spill is a Reportable Quantity

1) First determine the type and quantity of material that has been spilled.

2) Obtain a material safety data sheet (MSDS) for the spilled material and determine whether any of the constituents are listed in Table 302.4 in 40 CFR 302.

3) If none of the constituents in the spilled material are listed in the table (excluding ethylene glycol), the spill is not reportable.

4) If the constituents in the spilled material are listed in the table, use the following equation to determine the pounds of material spilled:

$$\text{Pounds Spilled} = (V)\ (Wt\%)\ (Sg)\ (0.0834)$$

Where:

V = Volume of the material spilled, in gallons

Wt% = The weight percent of the constituents in the spilled material (see the MSDS)

Sg = Specific gravity of spilled material (see MSDS)

For Example:

V = 7 gallons

Wt% = 3.5

Sg = 1.04

Pounds Spilled = (7) (3.5) (1.04) (0.0834) = 2.13 pounds

5) If, based on the calculation, the pounds spilled are greater than the Final RQ (reportable quantity) value listed in Table 302.4 of 40 CFR 302 or the State's reportable quantity minimum amount, the spill must be reported to the appropriate federal, state, and local agencies.

Ameren Belleau Solar Project

Stormwater Pollution Prevention Plan

SPILL REPORT

Spill Reported By: ______________________________ ________________________

Name Phone Number

Date Reported: ______________________________ Time: ____________________

Date of Spill: ______________________________ Time: ____________________

Name of Facility: ____

Legal Description: _____ 1/4 ____ 1/4 _____ 1/4 SEC ____, TWP ____, Range _____,

County ______________________________

Describe Spill Location and Events Leading to Spill: ______________________________

____

____

____

Material Spilled: ____

Source of Spill: ____

Amount Spilled (Gallons or Pounds): ____

Amount Spilled to Waterway (Gallons or Pounds): __________________________________

Nearest Municipality: ____

Containment or Cleanup Action: ____

____

List Environmental Damage (fish kill, etc.): ____

____

List Injuries or Personal Contamination: ____________________

____

Date and Time Cleanup Completed or Terminated: ____________________

If Cleanup Delayed, Nature and Duration of Delay: ____________________

____

Description of Materials Contaminated: ____________________

____

Approximate Depth of Soil Excavation: ____________________

Action To Be Taken to Prevent Future Spills: ____________________

____

____

Agencies Notified:

Local: ____________________ Date: __________

State: ____________________ Date: __________

Federal: ____________________ Date: __________

Signed: ____________________
Contractor Superintendent or
Environmental Inspector

APPENDIX F – RECORD OF REVISIONS

Ameren Belleau Solar Project
Stormwater Pollution Prevention Plan

RECORD OF REVISIONS

Name of Permittee: Ameren Missouri

Construction Site Name: Ameren Belleau Solar Project

Inspector: ______________________________ Date: ______________

Date	Sections Modified	Description of Modification	Approval Signatures

APPENDIX G – PERMIT AUTHORIZATION

After the ePermitting process is complete for Permit coverage, the authorization from the MDNR will be placed in Appendix G.

APPENDIX H – PUBLIC NOTIFICATION SIGN

Ameren Belleau Solar Project

PUBLIC NOTIFICATION

For Stormwater Discharges Associated with Construction Activity
Authorized by Missouri Department of Natural Resources General Permit
Under the National Pollutant Discharge Elimination System

Permittee:	Ameren Missouri
Project Name:	Ameren Belleau Solar Project
Issued General Permit No.:	
Facility Contact Name:	
Project Description:	The Project will construct a 5.7 megawatt DC (4.5 megawatt AC) solar photovoltaic power plant directly adjacent to Ameren's existing Belleau substation at 1621 Highway 79 in O'Fallon, Missouri. The Project site is approximately 33.7 acres of which approximately 27.4 acres will be disturbed. Construction is scheduled to begin June 2014 and be completed in December 2014.

APPENDIX I – NOTICE OF TERMINATION

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION BRANCH
(SEE MAP FOR APPROPRIATE REGIONAL OFFICE)

FORM H – REQUEST FOR TERMINATION OF A GENERAL PERMIT

UNDER MISSOURI CLEAN WATER LAW

1.00 TYPE OF GENERAL PERMIT REQUESTED TO BE TERMINATED
Land Disturbance

1.10 PERMIT NUMBER
MO -

2.00 FACILITY

NAME Ameren Belleau Solar Project		COUNTY St. Charles	
ADDRESS 1621 Highway 79	CITY O'Fallon	STATE MO	ZIP CODE 63366

3.00 OWNER

NAME Ameren Missouri	E- MAIL	PHONE (800) 552-7583 FAX	
ADDRESS 1901 Chouteau Avenue	CITY St. Louis	STATE MO	ZIP CODE 63166

4.00 CONTINUING AUTHORITY

NAME Same as 3.00.		PHONE FAX	
ADDRESS	CITY	STATE	ZIP CODE

5 00 REASON FOR TERMINATION REQUEST: (CHECK ONE)

- [x] For land disturbance sites, area is stabilized by seeding, mulching, sodding, paving, or other means, no further land disturbance activities are planned, all building construction (commercial or residential) is completed, and construction equipment removed.
- [ ] For industrial facilities, site activities have ceased and site closed and no significant materials remain exposed to storm water.
- [ ] For any type of site, a site specific permit was obtained.
- [ ] Other reason (specify) _____

6.00 I CERTIFY THAT I AM FAMILIAR WITH THE INFORMATION CONTAINED IN THE TERMINATION REQUEST, THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF SUCH INFORMATION IS TRUE, COMPLETE AND ACCURATE.

NAME AND OFFICIAL TITLE (TYPE OR PRINT)	TELEPHONE NO. (AREA CODE)
SIGNATURE	DATE SIGNED

Burns & McDonnell
SINCE 1898

Burns & McDonnell World Headquarters
9400 Ward Parkway
Kansas City, MO 64114
Phone: 816-333-9400
Fax: 816-333-3690
www.burnsmcd.com

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Burns & McDonnell
SINCE 1898

Drainage Report on the

O'Fallon Renewable Energy Center

Ameren
MISSOURI

Ameren Missouri

Project No. 77051

May 2014

STATE OF MISSOURI
STEVEN
BEAM
NUMBER
PE-20090[illegible]15
PROFESSIONAL ENGINEER

05/06/2014

Ameren COG Solar Project

prepared for

Ameren Missouri
O'Fallon, Missouri

April 2014

Project No. 77051

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

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1.0 BASIS OF DESIGN

A 4.5 MW photovoltaic power plant is being proposed on two tracts totaling 33.7 acres that lie north of TR Hughes Boulevard. The property is currently zoned I-1, Light Industrial. The property is currently undeveloped and lies adjacent to the Union Electric Company substation. All drainage designs have been prepared in accordance with the City of O'Fallon, MO Code, particularly Sections 405.230 through 205.245. Existing drainage patterns have generally been maintained with the development of the site by discharging runoff in the post-developed condition at the same locations and at peak rates below that of pre-developed conditions. Additionally, water quality best management practices will be employed that ensure downstream water quality is not impaired by this project.

This report will describe the existing conditions of the site and how the proposed improvements have been designed to avoid any adverse impacts to downstream property owners.

1.1 Existing Conditions

The existing 33.7 acre site is predominantly an agricultural field with some wooded cover along the east and north sides. Larger concentrations of forested cover are on the extreme north end of the site and inside the elbow of the northern boundary.

The existing slope of the property is generally from the SW to the NE. Some surface runoff is concentrated into a ravine that forms in the elbow of the northern boundary that continues to the NE. The southern tract that abuts TR Hughes Boulevard flows to the East into a shallow swale that parallels the roadway. The stormwater in this swale is then collected by a series of pipes extending from the roadway storm sewer network into the swale.

The existing site has been delineated into four drainage basins based on the four specific locations runoff exits the property in both pre-developed and post-developed conditions. The Pre-developed Drainage Map is included in Appendix A. A summary of the existing runoff data is provided in the next section in Table 1-1.

1.2 Proposed Conditions

The proposed improvements to the site involve the grading and placing of Type 5 base rock over the site to create the necessary service drives and yard area to support the installation of the solar panels and equipment for the 4.5 MW photovoltaic power plant. In addition to these improvements, swales are being graded along some service roads to capture and transport surface runoff to the detention ponds & bioretention basins. All drainage for the site will be conveyed on the surface.

Additionally, a small observation area with six parking spaces will be constructed on the southern tract to allow the public to view the renewable energy power plant. These improvements lie within Area 4, which by diverting some of the pre-developed drainage area into Area 3 during post-development, no detention is required in this area. A pair of 18" culverts will be placed in the existing swale and transport water across the drive that enters the observation area and plant site. The basis of design for these pipes is discussed further in Section 1.2.1 Storm Sewer System.

The proposed improvements on the site have been designed to maintain existing drainage patterns and peak flow rates being discharged from the site at each of the four outfalls. A Pre-developed Drainage Map is included in Appendix B. At each outfall, the post-developed peak discharge rates for the 2-,15-, 25-, & 100-year storm events have been designed to be less than pre-developed flow rates. This has been accomplished with the use of detention in Areas 1 & 2 and by reducing the contributing drainage area discharging to the outfalls for Areas 3 & 4. Table 1-1 summarizes the pre- & post-developed peak flow rates. Table 1-2 provides detailed information on Areas 2 & 4 where detention is not being used. Section 1.2.2 Stormwater Detention discusses the basis of design for the detention ponds. Undetained peak runoff calculations using the Rational Method are attached in Appendix C.

Table 1-1: Summary of Peak Discharges from Site

Area	**Storm Event** *(year)*	**Pre-developed Peak Flow Rate** *(cfs)*	**Post-developed Peak Flow Rate** *(cfs)*	**Change in Peak Flow Rate** *(cfs)*
1*	2	11.6	9.0	-2.6
	15	18.9	17.3	-1.6
	25	21.8	20.7	-1.1
	100	28.3	27.7	-0.6
2*	2	11.6	4.2	-7.4
	15	18.8	8.7	-10.1
	25	21.5	10.5	-11.0
	100	27.9	15.4	-12.5
3	2	12.2	2.4	-9.8
	15	19.9	3.8	-16.1
	25	22.9	4.3	-18.6
	100	29.7	5.6	-24.1
4	2	15.2	13.6	-1.6
	15	25.0	22.3	-2.7
	25	28.7	25.6	-3.1
	100	37.4	33.2	-4.2

*For Areas 1 & 3, the post-developed peak flow rate is the flow rate being discharged from the detention ponds in those areas. See Tables 1-2 & 1-3 for source.

1.2.1 Storm Sewer System

Due to the nature of the project, the proposed improvements utilize grading and surface drainage to direct and control the runoff within the site. The only pipe networks will be those exiting the two detention ponds and a culvert under the driveway off TR Hughes Boulevard entering the project site.

All runoff calculations were performed using the Rational Method in accordance with Section 405.230.C with runoff factors applied for the 15-year and larger storm events. The driveway culvert was sized to convey the 15-year peak flow rate of 22.3 CFS without overtopping the driveway. The culvert design worksheet is attached in Appendix D.

1.2.2 Stormwater Detention

In order to limit our post-developed runoff to levels predicted pre-development, two detention ponds have been designed for the project. One will be located at the outfall of Area 1, and the other will be located at the outfall of Area 2. Because these are each simple, single basins with less than 30 acres of area contributing to either of them, the Modified Rational Method approach has been used to design these ponds and outlet structures. Information found on the Rational Method Worksheet in Appendix C was used to develop the Modified Rational hydrographs to be routed through the ponds.

While, as will be seen in the Stormwater Quality Management section of this report, we have incorporated bioretention into the bottom of these detention ponds, the ponds have been sized without consideration of the infiltration that will realized through the bioretention system. By doing so, our design volume and anticipated discharges are conservative.

The outlet design for both ponds is comprised of an area inlet riser box with a vertical slot cast into one face of the riser. The pond in Area 1 has an 8" wide slot, whereas the pond in Area 2 requires a 12" wide slot. The top of the inlet box will have a 12" tall opening on the front and sides to serve as emergency overflow in the event a portion of the vertical slot is clogged. The risers' outlet pipes have been designed to convey the 100-year detained flow rate without adversely affecting the operation of the outlet structure. A summary of the operational characteristics of the two detention ponds is included in Tables 1-2 & 1-3. The detailed report for the detention ponds is included in Appendix E.

Table 1-2: Area 1 Detention Pond Summary

Storm Event *(year)*	Peak Inflow Rate *(cfs)*	Max. Storage Elevation *(ft)*	Max. Storage Volume *(ac-ft)*	Peak Discharge *(cfs)*
2	28.5	497.73	1.079	9.0
15	45.4	499.22	1.816	17.3
25	51.1	499.75	2.106	20.7
100	63.8	500.77	2.839	27.7

Note: The top of bank elevation for this detention pond is 502.0.

Table 1-3: Area 2 Detention Pond Summary

Storm Event *(year)*	Peak Inflow Rate *(cfs)*	Max. Storage Elevation *(ft)*	Max. Storage Volume *(ac-ft)*	Peak Discharge *(cfs)*
2	23.3	497.26	0.583	4.2
15	36.1	498.06	0.990	8.7
25	41.7	498.34	1.134	10.5
100	52.6	499.00	1.501	15.4

Note: The top of bank elevation for this detention pond is 503.0.

1.2.3 Stormwater Quality Management

In order to protect the downstream receiving waters from detrimental stormwater discharges, the project will include stormwater best management practices that have been proven to capture and treat the water quality volume and remove 80% of the total suspended solids from this volume of runoff.

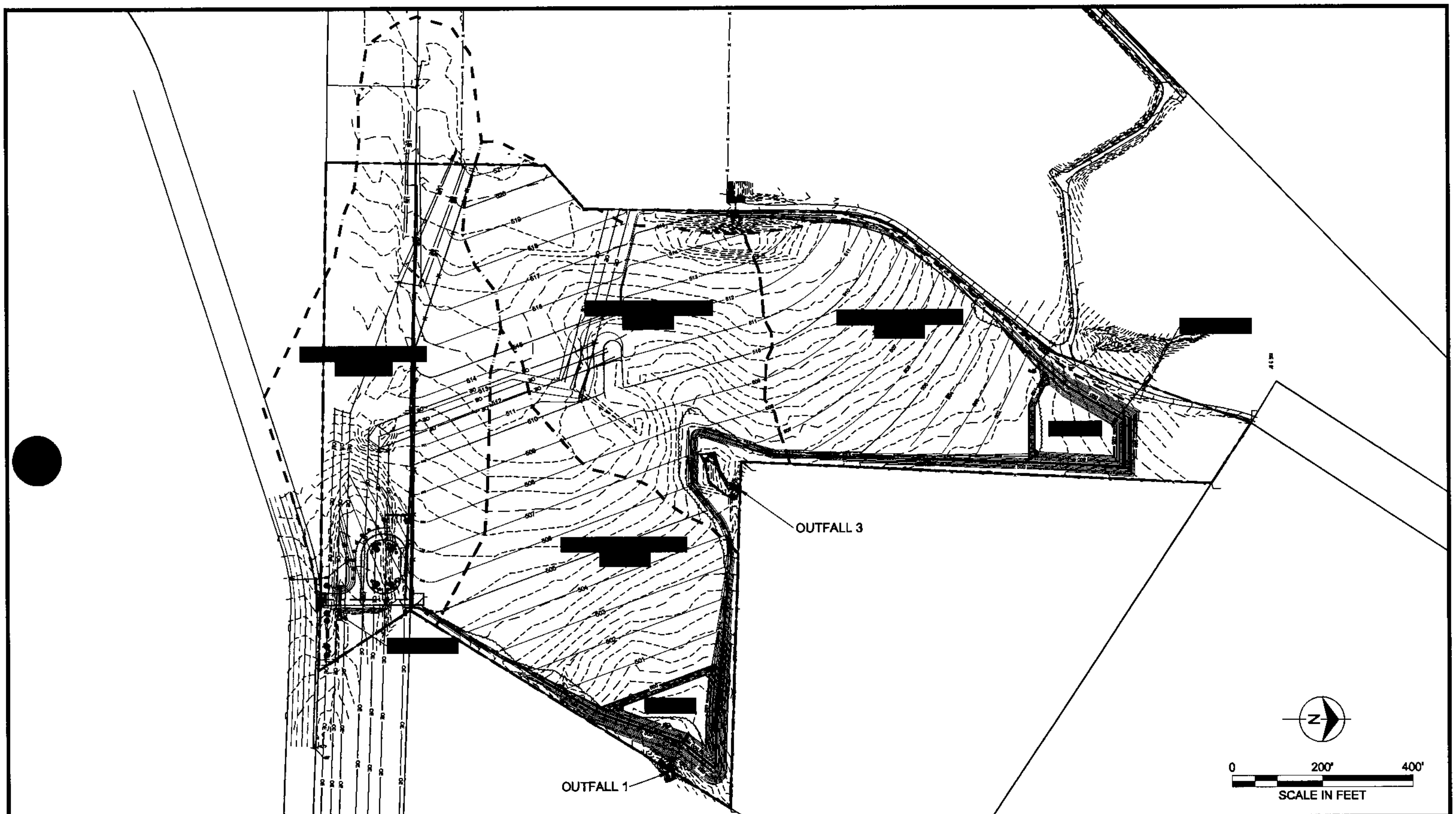
The site will generally be covered by Type 5 aggregate base course. This base contains many fines and, therefore, is not highly drainable. An effective % imperviousness of the surface of 85% has been used in determining the water quality volume that must be treated by these. All of the runoff will be managed on the surface through the use of open channels running parallel to the service roads that will discharge into our detention ponds with a bioretention system designed into the bottoms of these ponds.

Appendix F includes the worksheet used to design the best management practices following the Georgia Stormwater Management Manual procedures.

1.3 Conclusion

The storm water practices designed into this project have been developed in accordance with the City of O'Fallon's Subdivision and Land Development Code and standard engineering practice. As has been shown in this report, post-developed discharges have been both limited to pre-development peak levels and have been treated to remove 80% of TSS from the water quality volume.

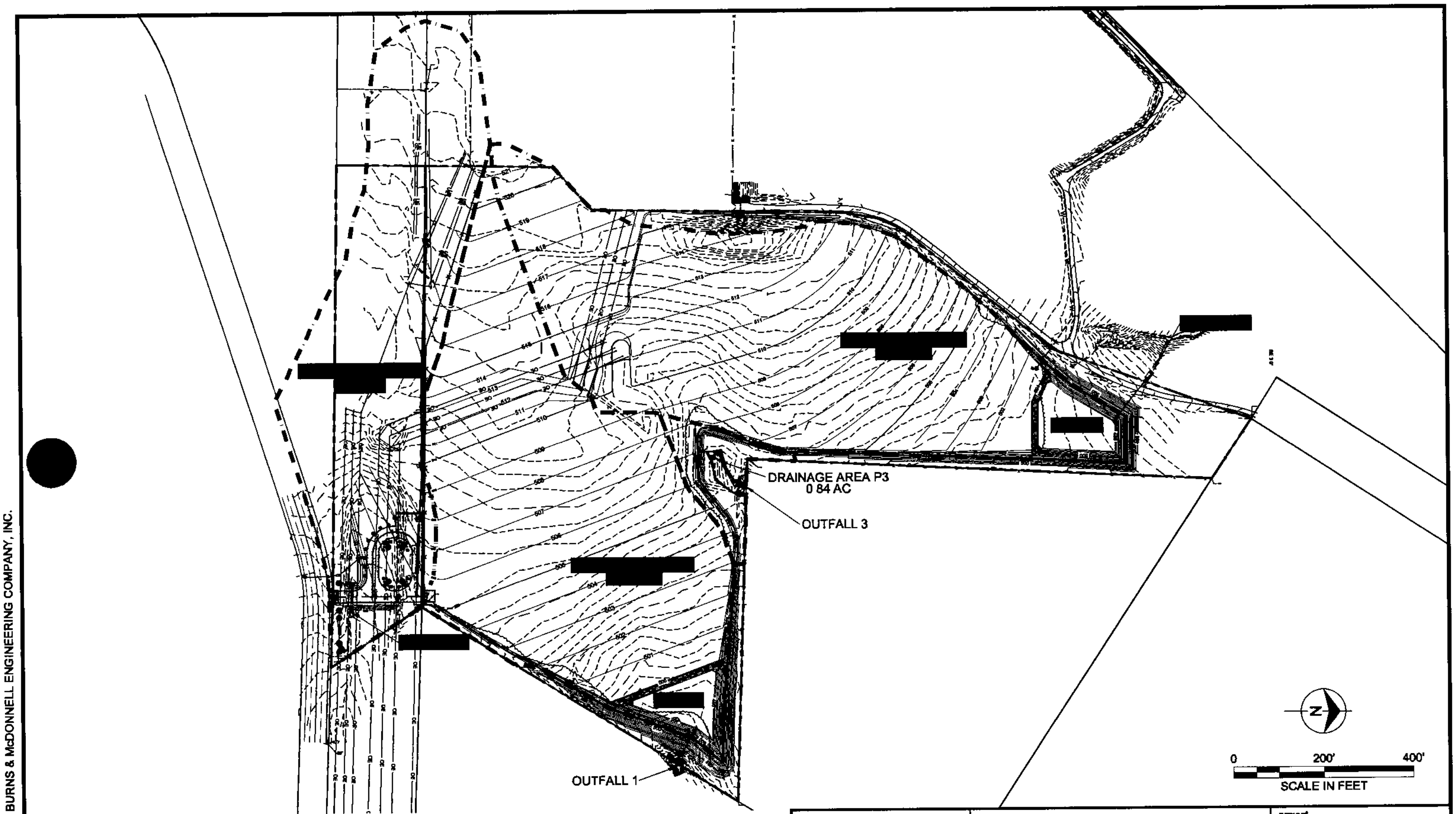
APPENDIX A - PRE-DEVELOPED DRAINAGE AREA MAP



Burns & McDonnell

date 4/11/14	**AMEREN COG SOLAR PROJECT**	project 77051
designed S. BEAM	PRE-DEVELOPMENT DRAINAGE AREA MAP	contract
		dwg no E1 rev –

APPENDIX B - POST-DEVELOPED DRAINAGE AREA MAP



Burns & McDonnell

date	4/11/14
designed	S. BEAM

AMEREN COG SOLAR PROJECT
POST-DEVELOPMENT
DRAINAGE AREA MAP

project	77051
contract	
dwg no	E2
rev	

APPENDIX C - RATIONAL METHOD WORKSHEET

RATIONAL METHOD WORKSHEET (D.A. < 100 ACRES)

Project	Location:	By:	Date	Client	Job No.:
Ameren COG Solar Project	O'Fallon, Missouri	Steven Beam, P.E.	4/8/2014	Ameren Missouri	77051

$Q = C_f C\,I\,A$ where: Q = peak discharge, cfs

C = a coefficient representing the ratio of runoff to rainfall (related to impervious area i e., 1 0 = 100% runoff)

I = rainfall intensity, in. / hr.

A = drainage area in acres

CALCULATION OF WEIGHTED RUNOFF COEFFICIENT

Name:	Slope	Land Use	Soil	Area (ac)	C	Slope	Land Use	Soil	Area (ac)	C	Slope	Land Use	Soil	Area (ac)	C	Slope	Land Use	Soil	Area (ac)	C	Weighted C
E1	Rolling	Pasture	Impervious	8.01	0.4					0					0					0	0 4
E2	Rolling	Pasture	Impervious	6.97	0.4					0					0					0	0.4
E3	Rolling	Pasture	Impervious	8.28	0.4					0					0					0	0.4
E4	Rolling	Pasture	Impervious	10.93	0 4					0					0					0	0.4
P1	Rolling	Commercial	Impervious	14.78	0.85					0					0					0	0.85
P2	Rolling	Commercial	Impervious	8.95	0.85					0					0					0	0.85
P3	Rolling	Commercial	Impervious	0.24	0 85	Rolling	Pasture	Impervious	0.6	0 4					0					0	0.53
P4	Rolling	Commercial	Impervious	0.55	0 85	Rolling	Pasture	Impervious	7.92	0.4					0					0	0.43

CALCULATION OF TIME OF CONCENTRATION USING TR55 METHOD

Name:	Sheet Flow						Shallow Concentrated Flow					Channel Flow								T_c
	Surface	n	L	P_2	s	T_t	Surface	L	s	V	T_t	a	P_w	r	s	n	V	L	T_t	(hr)
[illegible]	Fallow	0 04	300	3.1	0.01	0 18	Unpaved	843	0.04	3.23	0 07								0	0 25
[illegible]	Fallow	0.04	300	3.1	0.03	0 12	Unpaved	678	0.035	3.02	0.06								0	0.18
E3	Fallow	0 04	300	3.1	0.015	0.16	Unpaved	635	0.02	2 28	0 08								0	0 24
E4	Fallow	0.04	300	3.1	0.01	0.18	Unpaved	840	0.025	2 55	0.09								0	0 27
P1	Smooth	0 015	300	3.1	0.02	0.06	Unpaved	1330	0.01	1 61	0 23								0	0 29
P2	Smooth	0 015	300	3.1	0.02	0.06	Unpaved	929	0.01	1.61	0 16								0	0 22
P3	Smooth	0 015	100	3.1	0.02	0 03	Unpaved	150	0.05	3.61	0.01								0	0.08
P4	Fallow	0.04	300	3.1	0.02	0.14	Unpaved	840	0.025	2 55	0 09								0	0 23

CALCULATION OF RATIONAL METHOD PEAK DISCHARGE RATES

Name:	C	I_2 (in/hr)	I_5 (in/hr)	I_{10} (in/hr)	I_{15} (in/hr)	I_{25} (in/hr)	I_{50} (in/hr)	I_{100} (in/hr)	A (ac)	=	Q_2 (cfs)	Q_5 (cfs)	Q_{10} (cfs)	Q_{15} (cfs)	Q_{25} (cfs)	Q_{50} (cfs)	Q_{100} (cfs)
E1	0 4	3.59	4 73	5 32	5 36	5.89	6.48	7.05	8 28	=	11.9	15.7	17.7	19.6	22.5	25.8	29.2
E2	0.4	4.15	4 99	5 71	6 1	6 69	7 35	7 99	8.01	=	13.3	16.0	18.3	21.5	24.7	28.3	32.0
E3	0 4	3.66	4 84	5 45	5 45	5 99	6 59	7.17	6.97	=	10.3	13.5	15.2	16.8	19.3	22.1	25.0
E4	0 4	3.46	4 52	5 09	5 18	5.7	6.28	6.83	10 93	=	15.2	19.8	22.3	25.0	28.7	33.0	37.4
P1	0.53	3.34	4 33	4 88	5 01	5 52	6.08	6.62	0.84	=	1.5	2.0	2.2	2.5	2.9	3.3	3.7
P2	0.85	3.81	5.1	5 74	5 65	6 21	6 82	7 42	14.78	=	47.9	64.1	72.2	78.1	89.8	102.9	116.6
P3	0.85	5.32	9.07	10.11	7.62	8 33	9 16	9 94	8 95	=	40.5	69.1	77.0	63.8	72.9	83.7	94.6
P4	0.43	3.73	4 97	5 59	5.55	6.1	6.71	7 29	8 47	=	13.6	18.2	20.4	22.3	25.6	29.4	33.2

NOTES:

1. Runoff factors are applied to the 15-100 year storm events per 405.230.C.5.
2. Intensity values are from MoDOT District 6 IDF curves.

APPENDIX D - CULVERT DESIGN WORKSHEET

Culvert Calculator Report
Area 4 Driveway Culvert

lve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	502.00 ft	Headwater Depth/Height	1.78
Computed Headwater Elev≀	500.67 ft	Discharge	22.30 cfs
Inlet Control HW Elev.	500.58 ft	Tailwater Elevation	499.00 ft
Outlet Control HW Elev.	500.67 ft	Control Type	Outlet Control

Grades

Upstream Invert	498.00 ft	Downstream Invert	497.00 ft
Length	65.50 ft	Constructed Slope	0.015267 ft/ft

Hydraulic Profile

Profile	PressureProfile	Depth, Downstream	2.00 ft
Slope Type	N/A	Normal Depth	1.07 ft
Flow Regime	N/A	Critical Depth	1.28 ft
Velocity Downstream	6.31 ft/s	Critical Slope	0.010584 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	1.50 ft
Section Size	18 inch	Rise	1.50 ft
Number Sections	2		

Outlet Control Properties

Outlet Control HW Elev.	500.67 ft	Upstream Velocity Head	0.62 ft
Ke	0.50	Entrance Loss	0.31 ft

Inlet Control Properties

Inlet Control HW Elev.	500.58 ft	Flow Control	Submerged
Inlet Type	Square edge w/headwall	Area Full	3.5 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

APPENDIX E - DETENTION POND DESIGN REPORTS

Project Summary

Title	Ameren COG Solar Project Basin 1
Engineer	Steven Beam, P.E.
Company	Burns & McDonnell
Date	4/11/2014

Notes

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Modified Rational Method

Q = CiA * Units Conversion; Where conversion = 43560 / (12 * 3600)

Frequency (years)	Area (acres)	Adjusted C Coefficient	Duration (hours)	Intensity (in/h)	Flow (Peak) (ft^3/s)	Flow (Allowable) (ft^3/s)
2	14.780	0.850	0.583	2.250	28.50	11.49
15	14.780	0.850	0.650	3.584	45.40	18.85
25	14.780	0.850	0.683	4.034	51.10	21.68
100	14.780	0.850	0.767	5.035	63.78	28.20

Volume (inflow) (ac-ft)	Volume (Storage) (ac-ft)
1.374	0.838
2.439	1.459
2.886	1.701
4.041	2.313

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
AREA 1	2-year	2	1.373	0.300	28.50
AREA 1	15-year	15	2.439	0.300	45.40
AREA 1	25-year	25	2.884	0.300	51.10
AREA 1	100-year	100	4.037	0.300	63.78

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
O-1	2-year	2	1.368	0.800	8.96
O-1	15-year	15	2.433	0.850	17.28
O-1	25-year	25	2.878	0.850	20.65
O-1	100-year	100	4.030	0.950	27.71

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
POND 1 (IN)	2-year	2	1.373	0.300	28.50	(N/A)	(N/A)
POND 1 (OUT)	2-year	2	1.368	0.800	8.96	497.73	1.079
POND 1 (IN)	15-year	15	2.439	0.300	45.40	(N/A)	(N/A)
POND 1 (OUT)	15-year	15	2.433	0.850	17.28	499.22	1.816
POND 1 (IN)	25-year	25	2.884	0.300	51.10	(N/A)	(N/A)
POND 1 (OUT)	25-year	25	2.878	0.850	20.65	499.75	2.106
POND 1 (IN)	100-year	100	4.037	0.300	63.78	(N/A)	(N/A)
POND 1 (OUT)	100-year	100	4.030	0.950	27.71	500.77	2.839

Time of Concentration Results (Pre-Development)

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	(N/A)
Slope	0.010 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	0.46 ft/s
Segment Time of Concentration	0.183 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	843.00 ft
Is Paved?	False
Slope	0.040 ft/ft
Average Velocity	3.23 ft/s
Segment Time of Concentration	0.073 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.256 hours

==== **SCS Channel Flow**

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== **SCS TR-55 Shallow Concentration Flow**

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	0.015
Slope	0.020 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	1.32 ft/s
Segment Time of Concentration	0.063 hours
Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	1,330.00 ft
Is Paved?	False
Slope	0.010 ft/ft
Average Velocity	1.61 ft/s
Segment Time of Concentration	0.229 hours
Time of Concentration (Composite)	
Time of Concentration (Composite)	0.292 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Time of Concentration Results (Pre-Development)

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	(N/A)
Slope	0.010 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	0.46 ft/s
Segment Time of Concentration	0.183 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	843.00 ft
Is Paved?	False
Slope	0.040 ft/ft
Average Velocity	3.23 ft/s
Segment Time of Concentration	0.073 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.256 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Subsection: Time of Concentration Calculations (Post-Development)

Return Event: 15 years

Label: AREA 1

Storm Event: MoDOT Curves for O'Fallon - 15 Year

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	0.015
Slope	0.020 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	1.32 ft/s
Segment Time of Concentration	0.063 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	1,330.00 ft
Is Paved?	False
Slope	0.010 ft/ft
Average Velocity	1.61 ft/s
Segment Time of Concentration	0.229 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.292 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Subsection: Time of Concentration Calculations (Pre-Development)

Label: AREA 1

Return Event: 25 years

Storm Event: MoDOT Curves for O'Fallon - 25 Year

Time of Concentration Results (Pre-Development)

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	(N/A)
Slope	0.010 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	0.46 ft/s
Segment Time of Concentration	0.183 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	843.00 ft
Is Paved?	False
Slope	0.040 ft/ft
Average Velocity	3.23 ft/s
Segment Time of Concentration	0.073 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.256 hours

==== **SCS Channel Flow**

Tc =

R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n
(Lf / V) / 3600

Where:

R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== **SCS TR-55 Shallow Concentration Flow**

Tc =

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:

V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	0.015
Slope	0.020 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	1.32 ft/s
Segment Time of Concentration	0.063 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	1,330.00 ft
Is Paved?	False
Slope	0.010 ft/ft
Average Velocity	1.61 ft/s
Segment Time of Concentration	0.229 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.292 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Subsection: Time of Concentration Calculations (Pre-Development)

Label: AREA 1

Return Event: 100 years

Storm Event: MoDOT Curves for O'Fallon - 100 Year

Time of Concentration Results (Pre-Development)

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	(N/A)
Slope	0.010 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	0.46 ft/s
Segment Time of Concentration	0.183 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	843.00 ft
Is Paved?	False
Slope	0.040 ft/ft
Average Velocity	3.23 ft/s
Segment Time of Concentration	0.073 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.256 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	0.015
Slope	0.020 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	1.32 ft/s
Segment Time of Concentration	0.063 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	1,330.00 ft
Is Paved?	False
Slope	0.010 ft/ft
Average Velocity	1.61 ft/s
Segment Time of Concentration	0.229 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.292 hours

==== **SCS Channel Flow**

Tc =

R = Qa / Wp
V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n

(Lf / V) / 3600

Where:

R= Hydraulic radius
Aq= Flow area, square feet
Wp= Wetted perimeter, feet
V= Velocity, ft/sec
Sf= Slope, ft/ft
n= Manning's n
Tc= Time of concentration, hours
Lf= Flow length, feet

==== **SCS TR-55 Shallow Concentration Flow**

Tc =

Unpaved surface:
V = 16.1345 * (Sf**0.5)

Paved Surface:
V = 20.3282 * (Sf**0.5)

(Lf / V) / 3600

Where:

V= Velocity, ft/sec
Sf= Slope, ft/ft
Tc= Time of concentration, hours
Lf= Flow length, feet

Subsection: Time vs. Elevation

Label: POND 1 (OUT)

Return Event: 2 years

Storm Event: MoDOT Curves for O'Fallon - 2 Year

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	495.00	495.03	495.12	495.26
0.250	495.70	495.97	496.26	496.52
0.500	497.00	497.21	497.41	497.56
0.750	497.72	497.73	497.69	497.62
1.000	497.48	497.41	497.34	497.27
1.250	497.15	497.09	497.03	496.98
1.500	496.87	496.82	496.77	496.73
1.750	496.64	496.60	496.56	496.52
2.000	496.45	496.41	496.38	496.34
2.250	496.28	496.25	496.22	496.19
2.500	496.14	496.11	496.09	496.07
2.750	496.02	496.00	495.98	495.96
3.000	495.92	495.90	495.88	495.86
3.250	495.83	495.81	495.80	495.78
3.500	495.75	495.74	495.72	495.71
3.750	495.68	495.67	495.66	495.65
4.000	495.62	495.61	495.60	495.59
4.250	495.57	495.56	495.55	495.54
4.500	495.52	495.52	495.51	495.50
4.750	495.48	495.48	495.47	495.46
5.000	495.45	495.44	495.43	495.43
5.250	495.41	495.41	495.40	495.40
5.500	495.38	495.38	495.37	495.37
5.750	495.36	495.35	495.35	495.34
6.000	495.33	495.33	495.33	495.32
6.250	495.31	495.31	495.30	495.30
6.500	495.29	495.29	495.29	495.28
6.750	495.28	495.27	495.27	495.27
7.000	495.26	495.26	495.25	495.25
7.250	495.24	495.24	495.24	495.24
7.500	495.23	495.23	495.22	495.22
7.750	495.22	495.22	495.21	495.21
8.000	495.21	495.20	495.20	495.20
8.250	495.20	495.19	495.19	495.19
8.500	495.19	495.18	495.18	495.18
8.750	495.18	495.17	495.17	495.17
9.000	495.17	495.17	495.16	495.16
9.250	495.16	495.16	495.16	495.15
9.500	495.15	495.15	495.15	495.15
9.750	495.14	495.14	495.14	495.14
10.000	495.14	495.14	495.14	495.13
10.250	495.13	495.13	495.13	495.13
10.500	495.13	495.12	495.12	495.12
10.750	495.12	495.12	495.12	495.12
11.000	495.12	495.11	495.11	495.11
11.250	495.11	495.11	495.11	495.11
11.500	495.11	495.11	495.10	495.10
11.750	495.10	495.10	495.10	495.10

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
12.000	495.10	495.10	495.10	495.10
12.250	495.09	495.09	495.09	495.09
12.500	495.09	495.09	495.09	495.09
12.750	495.09	495.09	495.09	495.09
13.000	495.08	495.08	495.08	495.08
13.250	495.08	495.08	495.08	495.08
13.500	495.08	495.08	495.08	495.08
13.750	495.08	495.07	495.07	495.07
14.000	495.07	495.07	495.07	495.07
14.250	495.07	495.07	495.07	495.07
14.500	495.07	495.07	495.07	495.07
14.750	495.06	495.06	495.06	495.06
15.000	495.06	495.06	495.06	495.06
15.250	495.06	495.06	495.06	495.06
15.500	495.06	495.06	495.06	495.06
15.750	495.06	495.06	495.05	495.05
16.000	495.05	495.05	495.05	495.05
16.250	495.05	495.05	495.05	495.05
16.500	495.05	495.05	495.05	495.05
16.750	495.05	495.05	495.05	495.05
17.000	495.05	495.05	495.05	495.04
17.250	495.04	495.04	495.04	495.04
17.500	495.04	495.04	495.04	495.04
17.750	495.04	495.04	495.04	495.04
18.000	495.04	495.04	495.04	495.04
18.250	495.04	495.04	495.04	495.04
18.500	495.04	495.04	495.04	495.04
18.750	495.04	495.03	495.03	495.03
19.000	495.03	495.03	495.03	495.03
19.250	495.03	495.03	495.03	495.03
19.500	495.03	495.03	495.03	495.03
19.750	495.03	495.03	495.03	495.03
20.000	495.03	495.03	495.03	495.03
20.250	495.03	495.03	495.03	495.03
20.500	495.03	495.03	495.03	495.03
20.750	495.03	495.03	495.03	495.03
21.000	495.02	495.02	495.02	495.02
21.250	495.02	495.02	495.02	495.02
21.500	495.02	495.02	495.02	495.02
21.750	495.02	495.02	495.02	495.02
22.000	495.02	495.02	495.02	495.02
22.250	495.02	495.02	495.02	495.02
22.500	495.02	495.02	495.02	495.02
22.750	495.02	495.02	495.02	495.02
23.000	495.02	495.02	495.02	495.02
23.250	495.02	495.02	495.02	495.02
23.500	495.02	495.02	495.02	495.02
23.750	495.02	495.02	495.02	495.02

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
24.000	495.02	(N/A)	(N/A)	(N/A)

Elevation (ft)
495.46
496.77
497.67
497.55
497.21
496.92
496.68
496.48
496.31
496.17
496.04
495.94
495.84
495.76
495.70
495.63
495.58
495.53
495.49
495.45
495.42
495.39
495.36
495.34
495.32
495.30
495.28
495.26
495.25
495.23
495.22
495.21
495.20
495.19
495.18
495.17
495.16
495.15
495.15
495.14
495.13
495.13
495.12
495.12
495.11

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
495.11
495.10
495.10
495.10
495.09
495.09
495.09
495.08
495.08
495.08
495.07
495.07
495.07
495.07
495.06
495.06
495.06
495.06
495.05
495.05
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495.05
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495.03
495.03
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495.03
495.03
495.03
495.03
495.03
495.03
495.02
495.02
495.02
495.02
495.02
495.02
495.02
495.02
495.02

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
495.02
495.02
495.02
(N/A)

Subsection: Time vs. Elevation
Label: POND 1 (OUT)

Return Event: 15 years
Storm Event: MoDOT Curves for O'Fallon - 15 Year

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	495.00	495.05	495.19	495.41
0.250	496.08	496.49	496.91	497.29
0.500	497.96	498.26	498.54	498.80
0.750	499.14	499.21	499.22	499.17
1.000	498.94	498.82	498.70	498.58
1.250	498.37	498.27	498.17	498.07
1.500	497.89	497.81	497.72	497.64
1.750	497.49	497.42	497.35	497.29
2.000	497.16	497.10	497.04	496.99
2.250	496.88	496.83	496.79	496.74
2.500	496.65	496.61	496.57	496.53
2.750	496.45	496.42	496.38	496.35
3.000	496.29	496.26	496.23	496.20
3.250	496.15	496.12	496.10	496.07
3.500	496.03	496.00	495.98	495.96
3.750	495.92	495.90	495.88	495.87
4.000	495.83	495.81	495.80	495.78
4.250	495.75	495.74	495.73	495.71
4.500	495.69	495.67	495.66	495.65
4.750	495.63	495.61	495.60	495.59
5.000	495.57	495.56	495.55	495.54
5.250	495.53	495.52	495.51	495.50
5.500	495.49	495.48	495.47	495.46
5.750	495.45	495.44	495.43	495.43
6.000	495.42	495.41	495.40	495.40
6.250	495.39	495.38	495.38	495.37
6.500	495.36	495.35	495.35	495.34
6.750	495.34	495.33	495.33	495.32
7.000	495.31	495.31	495.31	495.30
7.250	495.29	495.29	495.29	495.28
7.500	495.28	495.27	495.27	495.27
7.750	495.26	495.26	495.25	495.25
8.000	495.24	495.24	495.24	495.24
8.250	495.23	495.23	495.23	495.22
8.500	495.22	495.22	495.21	495.21
8.750	495.21	495.20	495.20	495.20
9.000	495.20	495.19	495.19	495.19
9.250	495.19	495.18	495.18	495.18
9.500	495.18	495.17	495.17	495.17
9.750	495.17	495.17	495.16	495.16
10.000	495.16	495.16	495.16	495.15
10.250	495.15	495.15	495.15	495.15
10.500	495.14	495.14	495.14	495.14
10.750	495.14	495.14	495.14	495.13
11.000	495.13	495.13	495.13	495.13
11.250	495.13	495.13	495.12	495.12
11.500	495.12	495.12	495.12	495.12
11.750	495.12	495.11	495.11	495.11

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
12.000	495.11	495.11	495.11	495.11
12.250	495.11	495.11	495.11	495.10
12.500	495.10	495.10	495.10	495.10
12.750	495.10	495.10	495.10	495.10
13.000	495.10	495.09	495.09	495.09
13.250	495.09	495.09	495.09	495.09
13.500	495.09	495.09	495.09	495.09
13.750	495.08	495.08	495.08	495.08
14.000	495.08	495.08	495.08	495.08
14.250	495.08	495.08	495.08	495.08
14.500	495.08	495.08	495.07	495.07
14.750	495.07	495.07	495.07	495.07
15.000	495.07	495.07	495.07	495.07
15.250	495.07	495.07	495.07	495.07
15.500	495.06	495.06	495.06	495.06
15.750	495.06	495.06	495.06	495.06
16.000	495.06	495.06	495.06	495.06
16.250	495.06	495.06	495.06	495.06
16.500	495.06	495.06	495.05	495.05
16.750	495.05	495.05	495.05	495.05
17.000	495.05	495.05	495.05	495.05
17.250	495.05	495.05	495.05	495.05
17.500	495.05	495.05	495.05	495.05
17.750	495.05	495.05	495.05	495.05
18.000	495.04	495.04	495.04	495.04
18.250	495.04	495.04	495.04	495.04
18.500	495.04	495.04	495.04	495.04
18.750	495.04	495.04	495.04	495.04
19.000	495.04	495.04	495.04	495.04
19.250	495.04	495.04	495.04	495.04
19.500	495.04	495.03	495.03	495.03
19.750	495.03	495.03	495.03	495.03
20.000	495.03	495.03	495.03	495.03
20.250	495.03	495.03	495.03	495.03
20.500	495.03	495.03	495.03	495.03
20.750	495.03	495.03	495.03	495.03
21.000	495.03	495.03	495.03	495.03
21.250	495.03	495.03	495.03	495.03
21.500	495.03	495.03	495.03	495.03
21.750	495.02	495.02	495.02	495.02
22.000	495.02	495.02	495.02	495.02
22.250	495.02	495.02	495.02	495.02
22.500	495.02	495.02	495.02	495.02
22.750	495.02	495.02	495.02	495.02
23.000	495.02	495.02	495.02	495.02
23.250	495.02	495.02	495.02	495.02
23.500	495.02	495.02	495.02	495.02
23.750	495.02	495.02	495.02	495.02

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
24.000	495.02	(N/A)	(N/A)	(N/A)

Elevation (ft)
495.71
497.64
499.01
499.06
498.47
497.98
497.57
497.22
496.94
496.69
496.49
496.32
496.17
496.05
495.94
495.85
495.77
495.70
495.64
495.58
495.54
495.49
495.46
495.42
495.39
495.36
495.34
495.32
495.30
495.28
495.26
495.25
495.23
495.22
495.21
495.20
495.19
495.18
495.17
495.16
495.15
495.15
495.14
495.13
495.13

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
495.12
495.12
495.11
495.11
495.10
495.10
495.10
495.09
495.09
495.09
495.08
495.08
495.08
495.07
495.07
495.07
495.07
495.06
495.06
495.06
495.06
495.05
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495.03
495.03
495.03
495.03
495.03
495.03
495.03
495.03
495.03
495.02
495.02
495.02
495.02
495.02
495.02

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
495.02
495.02
495.02
(N/A)

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	495.00	495.05	495.21	495.46
0.250	496.21	496.66	497.12	497.53
0.500	498.26	498.59	498.89	499.16
0.750	499.60	499.71	499.75	499.73
1.000	499.52	499.37	499.24	499.10
1.250	498.85	498.73	498.62	498.51
1.500	498.30	498.20	498.10	498.01
1.750	497.83	497.75	497.67	497.59
2.000	497.44	497.37	497.31	497.24
2.250	497.12	497.06	497.01	496.95
2.500	496.85	496.80	496.75	496.71
2.750	496.62	496.58	496.54	496.50
3.000	496.43	496.39	496.36	496.33
3.250	496.27	496.24	496.21	496.18
3.500	496.13	496.10	496.08	496.06
3.750	496.01	495.99	495.97	495.95
4.000	495.91	495.89	495.87	495.85
4.250	495.82	495.80	495.79	495.77
4.500	495.74	495.73	495.72	495.70
4.750	495.68	495.66	495.65	495.64
5.000	495.62	495.61	495.60	495.59
5.250	495.57	495.56	495.55	495.54
5.500	495.52	495.51	495.50	495.50
5.750	495.48	495.47	495.47	495.46
6.000	495.44	495.44	495.43	495.42
6.250	495.41	495.41	495.40	495.39
6.500	495.38	495.38	495.37	495.37
6.750	495.36	495.35	495.35	495.34
7.000	495.33	495.33	495.32	495.32
7.250	495.31	495.31	495.30	495.30
7.500	495.29	495.29	495.28	495.28
7.750	495.27	495.27	495.27	495.26
8.000	495.26	495.25	495.25	495.25
8.250	495.24	495.24	495.24	495.23
8.500	495.23	495.23	495.22	495.22
8.750	495.22	495.21	495.21	495.21
9.000	495.20	495.20	495.20	495.20
9.250	495.19	495.19	495.19	495.19
9.500	495.18	495.18	495.18	495.18
9.750	495.18	495.17	495.17	495.17
10.000	495.17	495.16	495.16	495.16
10.250	495.16	495.16	495.16	495.15
10.500	495.15	495.15	495.15	495.15
10.750	495.14	495.14	495.14	495.14
11.000	495.14	495.14	495.13	495.13
11.250	495.13	495.13	495.13	495.13
11.500	495.13	495.12	495.12	495.12
11.750	495.12	495.12	495.12	495.12

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
12.000	495.12	495.11	495.11	495.11
12.250	495.11	495.11	495.11	495.11
12.500	495.11	495.11	495.10	495.10
12.750	495.10	495.10	495.10	495.10
13.000	495.10	495.10	495.10	495.10
13.250	495.09	495.09	495.09	495.09
13.500	495.09	495.09	495.09	495.09
13.750	495.09	495.09	495.09	495.09
14.000	495.08	495.08	495.08	495.08
14.250	495.08	495.08	495.08	495.08
14.500	495.08	495.08	495.08	495.08
14.750	495.08	495.07	495.07	495.07
15.000	495.07	495.07	495.07	495.07
15.250	495.07	495.07	495.07	495.07
15.500	495.07	495.07	495.07	495.07
15.750	495.06	495.06	495.06	495.06
16.000	495.06	495.06	495.06	495.06
16.250	495.06	495.06	495.06	495.06
16.500	495.06	495.06	495.06	495.06
16.750	495.06	495.05	495.05	495.05
17.000	495.05	495.05	495.05	495.05
17.250	495.05	495.05	495.05	495.05
17.500	495.05	495.05	495.05	495.05
17.750	495.05	495.05	495.05	495.05
18.000	495.05	495.05	495.05	495.04
18.250	495.04	495.04	495.04	495.04
18.500	495.04	495.04	495.04	495.04
18.750	495.04	495.04	495.04	495.04
19.000	495.04	495.04	495.04	495.04
19.250	495.04	495.04	495.04	495.04
19.500	495.04	495.04	495.04	495.04
19.750	495.04	495.03	495.03	495.03
20.000	495.03	495.03	495.03	495.03
20.250	495.03	495.03	495.03	495.03
20.500	495.03	495.03	495.03	495.03
20.750	495.03	495.03	495.03	495.03
21.000	495.03	495.03	495.03	495.03
21.250	495.03	495.03	495.03	495.03
21.500	495.03	495.03	495.03	495.03
21.750	495.03	495.03	495.03	495.03
22.000	495.02	495.02	495.02	495.02
22.250	495.02	495.02	495.02	495.02
22.500	495.02	495.02	495.02	495.02
22.750	495.02	495.02	495.02	495.02
23.000	495.02	495.02	495.02	495.02
23.250	495.02	495.02	495.02	495.02
23.500	495.02	495.02	495.02	495.02
23.750	495.02	495.02	495.02	495.02

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
24.000	495.02	(N/A)	(N/A)	(N/A)

Elevation (ft)
495.80
497.91
499.41
499.64
498.98
498.40
497.92
497.52
497.18
496.90
496.66
496.47
496.30
496.15
496.03
495.93
495.84
495.76
495.69
495.63
495.58
495.53
495.49
495.45
495.42
495.39
495.36
495.34
495.32
495.30
495.28
495.26
495.25
495.23
495.22
495.21
495.20
495.19
495.18
495.17
495.16
495.15
495.15
495.14
495.13

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
495.13
495.12
495.12
495.11
495.11
495.10
495.10
495.10
495.09
495.09
495.08
495.08
495.08
495.08
495.07
495.07
495.07
495.07
495.06
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495.04
495.04
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495.04
495.04
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495.03
495.03
495.03
495.03
495.03
495.03
495.03
495.03
495.03
495.02
495.02
495.02
495.02
495.02

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
495.02
495.02
495.02
(N/A)

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	495.00	495.07	495.26	495.57
0.250	496.48	497.02	497.56	498.05
0.500	498.90	499.27	499.61	499.93
0.750	500.43	500.60	500.71	500.77
1.000	500.73	500.64	500.52	500.39
1.250	500.11	499.95	499.79	499.64
1.500	499.36	499.22	499.09	498.96
1.750	498.72	498.60	498.49	498.39
2.000	498.18	498.09	498.00	497.91
2.250	497.74	497.66	497.58	497.51
2.500	497.37	497.30	497.23	497.17
2.750	497.05	497.00	496.94	496.89
3.000	496.79	496.75	496.70	496.66
3.250	496.58	496.54	496.50	496.46
3.500	496.39	496.36	496.32	496.29
3.750	496.23	496.21	496.18	496.15
4.000	496.10	496.08	496.05	496.03
4.250	495.99	495.96	495.94	495.92
4.500	495.89	495.87	495.85	495.83
4.750	495.80	495.79	495.77	495.76
5.000	495.73	495.71	495.70	495.69
5.250	495.66	495.65	495.64	495.63
5.500	495.61	495.60	495.58	495.57
5.750	495.56	495.55	495.54	495.53
6.000	495.51	495.50	495.49	495.49
6.250	495.47	495.46	495.46	495.45
6.500	495.44	495.43	495.42	495.42
6.750	495.40	495.40	495.39	495.39
7.000	495.38	495.37	495.37	495.36
7.250	495.35	495.35	495.34	495.34
7.500	495.33	495.32	495.32	495.31
7.750	495.31	495.30	495.30	495.30
8.000	495.29	495.28	495.28	495.28
8.250	495.27	495.27	495.26	495.26
8.500	495.25	495.25	495.25	495.25
8.750	495.24	495.24	495.23	495.23
9.000	495.23	495.22	495.22	495.22
9.250	495.21	495.21	495.21	495.21
9.500	495.20	495.20	495.20	495.20
9.750	495.19	495.19	495.19	495.19
10.000	495.18	495.18	495.18	495.18
10.250	495.17	495.17	495.17	495.17
10.500	495.16	495.16	495.16	495.16
10.750	495.16	495.16	495.15	495.15
11.000	495.15	495.15	495.15	495.15
11.250	495.14	495.14	495.14	495.14
11.500	495.14	495.13	495.13	495.13
11.750	495.13	495.13	495.13	495.13

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
12.000	495.12	495.12	495.12	495.12
12.250	495.12	495.12	495.12	495.12
12.500	495.11	495.11	495.11	495.11
12.750	495.11	495.11	495.11	495.11
13.000	495.11	495.10	495.10	495.10
13.250	495.10	495.10	495.10	495.10
13.500	495.10	495.10	495.10	495.10
13.750	495.09	495.09	495.09	495.09
14.000	495.09	495.09	495.09	495.09
14.250	495.09	495.09	495.09	495.08
14.500	495.08	495.08	495.08	495.08
14.750	495.08	495.08	495.08	495.08
15.000	495.08	495.08	495.08	495.08
15.250	495.07	495.07	495.07	495.07
15.500	495.07	495.07	495.07	495.07
15.750	495.07	495.07	495.07	495.07
16.000	495.07	495.07	495.07	495.07
16.250	495.06	495.06	495.06	495.06
16.500	495.06	495.06	495.06	495.06
16.750	495.06	495.06	495.06	495.06
17.000	495.06	495.06	495.06	495.06
17.250	495.05	495.05	495.05	495.05
17.500	495.05	495.05	495.05	495.05
17.750	495.05	495.05	495.05	495.05
18.000	495.05	495.05	495.05	495.05
18.250	495.05	495.05	495.05	495.05
18.500	495.05	495.05	495.04	495.04
18.750	495.04	495.04	495.04	495.04
19.000	495.04	495.04	495.04	495.04
19.250	495.04	495.04	495.04	495.04
19.500	495.04	495.04	495.04	495.04
19.750	495.04	495.04	495.04	495.04
20.000	495.04	495.04	495.04	495.04
20.250	495.03	495.03	495.03	495.03
20.500	495.03	495.03	495.03	495.03
20.750	495.03	495.03	495.03	495.03
21.000	495.03	495.03	495.03	495.03
21.250	495.03	495.03	495.03	495.03
21.500	495.03	495.03	495.03	495.03
21.750	495.03	495.03	495.03	495.03
22.000	495.03	495.03	495.03	495.03
22.250	495.03	495.03	495.03	495.03
22.500	495.02	495.02	495.02	495.02
22.750	495.02	495.02	495.02	495.02
23.000	495.02	495.02	495.02	495.02
23.250	495.02	495.02	495.02	495.02
23.500	495.02	495.02	495.02	495.02
23.750	495.02	495.02	495.02	495.02

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
24.000	495.02	(N/A)	(N/A)	(N/A)

Elevation (ft)
495.98
498.49
500.21
500.77
500.25
499.50
498.84
498.28
497.82
497.43
497.11
496.84
496.62
496.43
496.26
496.13
496.01
495.91
495.82
495.74
495.67
495.62
495.57
495.52
495.48
495.44
495.41
495.38
495.36
495.33
495.31
495.29
495.27
495.26
495.24
495.23
495.22
495.20
495.19
495.18
495.17
495.17
495.16
495.15
495.14

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
495.14
495.13
495.13
495.12
495.11
495.11
495.11
495.10
495.10
495.09
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495.08
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495.03
495.03
495.03
495.03
495.03
495.03
495.02
495.02
495.02
495.02

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
495.02
495.02
495.02
(N/A)

Subsection: Elevation-Area Volume Curve

Return Event: 2 years

Label: POND 1

Storm Event: MoDOT Curves for O'Fallon - 2 Year

Elevation (ft)	Planimeter (ft²)	Area (acres)	A1+A2+sqr(A1*A2) (acres)
495.00	0.0	0.337	0.000
496.00	0.0	0.379	1.073
497.00	0.0	0.423	1.202
498.00	0.0	0.470	1.339
499.00	0.0	0.520	1.484
500.00	0.0	0.578	1.646
501.00	0.0	1.100	2.475
502.00	0.0	1.773	4.270

Volume (ac-ft)	Volume (Total) (ac-ft)
0.000	0.000
0.358	0.358
0.401	0.759
0.446	1.205
0.495	1.700
0.549	2.248
0.825	3.074
1.423	4.497

Pond Volume Equations

*** Incremental volume computed by the Conic Method for Reservoir Volumes.**

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(Area1 * Area2))

where:		
	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr(A1*A2) (acres)
495.00	0.0	0.337	0.000
496.00	0.0	0.379	1.073
497.00	0.0	0.423	1.202
498.00	0.0	0.470	1.339
499.00	0.0	0.520	1.484
500.00	0.0	0.578	1.646
501.00	0.0	1.100	2.475
502.00	0.0	1.773	4.270

Volume (ac-ft)	Volume (Total) (ac-ft)
0.000	0.000
0.358	0.358
0.401	0.759
0.446	1.205
0.495	1.700
0.549	2.248
0.825	3.074
1.423	4.497

Pond Volume Equations
* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(Area1 * Area2))

where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr(A1*A2) (acres)
495.00	0.0	0.337	0.000
496.00	0.0	0.379	1.073
497.00	0.0	0.423	1.202
498.00	0.0	0.470	1.339
499.00	0.0	0.520	1.484
500.00	0.0	0.578	1.646
501.00	0.0	1.100	2.475
502.00	0.0	1.773	4.270

Volume (ac-ft)	Volume (Total) (ac-ft)
0.000	0.000
0.358	0.358
0.401	0.759
0.446	1.205
0.495	1.700
0.549	2.248
0.825	3.074
1.423	4.497

Pond Volume Equations
*** Incremental volume computed by the Conic Method for Reservoir Volumes.**

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(Area1 * Area2))

where:		
	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr(A1*A2) (acres)
495.00	0.0	0.337	0.000
496.00	0.0	0.379	1.073
497.00	0.0	0.423	1.202
498.00	0.0	0.470	1.339
499.00	0.0	0.520	1.484
500.00	0.0	0.578	1.646
501.00	0.0	1.100	2.475
502.00	0.0	1.773	4.270

Volume (ac-ft)	Volume (Total) (ac-ft)
0.000	0.000
0.358	0.358
0.401	0.759
0.446	1.205
0.495	1.700
0.549	2.248
0.825	3.074
1.423	4.497

Pond Volume Equations
*** Incremental volume computed by the Conic Method for Reservoir Volumes.**

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(Area1 * Area2))

where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

Requested Pond Water Surface Elevations	
Minimum (Headwater)	495.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	502.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Irregular Weir	Weir - 1	Forward	TW	495.00	502.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	502.00
9.66	502.00
9.67	495.00
10.33	495.00
10.34	502.00
20.00	502.00

Lowest Elevation	495.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances

Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
495.00	0.00	(N/A)
495.10	0.06	(N/A)
495.20	0.18	(N/A)
495.30	0.33	(N/A)
495.40	0.50	(N/A)
495.50	0.70	(N/A)
495.60	0.92	(N/A)
495.70	1.16	(N/A)
495.80	1.42	(N/A)
495.90	1.69	(N/A)
496.00	1.98	(N/A)
496.10	2.29	(N/A)
496.20	2.61	(N/A)
496.30	2.94	(N/A)
496.40	3.29	(N/A)
496.50	3.65	(N/A)
496.60	4.02	(N/A)
496.70	4.40	(N/A)
496.80	4.79	(N/A)
496.90	5.20	(N/A)
497.00	5.62	(N/A)
497.10	6.04	(N/A)
497.20	6.48	(N/A)
497.30	6.93	(N/A)
497.40	7.39	(N/A)
497.50	7.86	(N/A)
497.60	8.33	(N/A)
497.70	8.82	(N/A)
497.80	9.32	(N/A)
497.90	9.82	(N/A)
498.00	10.34	(N/A)
498.10	10.86	(N/A)
498.20	11.39	(N/A)
498.30	11.93	(N/A)
498.40	12.48	(N/A)
498.50	13.03	(N/A)
498.60	13.60	(N/A)
498.70	14.17	(N/A)
498.80	14.75	(N/A)
498.90	15.34	(N/A)
499.00	15.94	(N/A)
499.10	16.54	(N/A)
499.20	17.15	(N/A)
499.30	17.77	(N/A)
499.40	18.40	(N/A)
499.50	19.03	(N/A)
499.60	19.67	(N/A)
499.70	20.32	(N/A)
499.80	20.98	(N/A)
499.90	21.64	(N/A)

Subsection: Composite Rating Curve

Label: Composite Outlet Structure - 1

Return Event: 2 years

Storm Event: MoDOT Curves for O'Fallon - 2 Year

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
500.00	22.31	(N/A)
500.10	22.98	(N/A)
500.20	23.67	(N/A)
500.30	24.35	(N/A)
500.40	25.05	(N/A)
500.50	25.75	(N/A)
500.60	26.46	(N/A)
500.70	27.18	(N/A)
500.80	27.90	(N/A)
500.90	28.63	(N/A)
501.00	29.37	(N/A)
501.10	30.11	(N/A)
501.20	30.86	(N/A)
501.30	31.61	(N/A)
501.40	32.37	(N/A)
501.50	33.14	(N/A)
501.60	33.91	(N/A)
501.70	34.69	(N/A)
501.80	35.48	(N/A)
501.90	36.27	(N/A)
502.00	37.06	(N/A)

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1

Composite Outflow Summary

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
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0.00	Weir - 1
0.00	Weir - 1
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0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1

Requested Pond Water Surface Elevations	
Minimum (Headwater)	495.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	502.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Irregular Weir	Weir - 1	Forward	TW	495.00	502.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	502.00
9.66	502.00
9.67	495.00
10.33	495.00
10.34	502.00
20.00	502.00

Lowest Elevation	495.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances

Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
495.00	0.00	(N/A)
495.10	0.06	(N/A)
495.20	0.18	(N/A)
495.30	0.33	(N/A)
495.40	0.50	(N/A)
495.50	0.70	(N/A)
495.60	0.92	(N/A)
495.70	1.16	(N/A)
495.80	1.42	(N/A)
495.90	1.69	(N/A)
496.00	1.98	(N/A)
496.10	2.29	(N/A)
496.20	2.61	(N/A)
496.30	2.94	(N/A)
496.40	3.29	(N/A)
496.50	3.65	(N/A)
496.60	4.02	(N/A)
496.70	4.40	(N/A)
496.80	4.79	(N/A)
496.90	5.20	(N/A)
497.00	5.62	(N/A)
497.10	6.04	(N/A)
497.20	6.48	(N/A)
497.30	6.93	(N/A)
497.40	7.39	(N/A)
497.50	7.86	(N/A)
497.60	8.33	(N/A)
497.70	8.82	(N/A)
497.80	9.32	(N/A)
497.90	9.82	(N/A)
498.00	10.34	(N/A)
498.10	10.86	(N/A)
498.20	11.39	(N/A)
498.30	11.93	(N/A)
498.40	12.48	(N/A)
498.50	13.03	(N/A)
498.60	13.60	(N/A)
498.70	14.17	(N/A)
498.80	14.75	(N/A)
498.90	15.34	(N/A)
499.00	15.94	(N/A)
499.10	16.54	(N/A)
499.20	17.15	(N/A)
499.30	17.77	(N/A)
499.40	18.40	(N/A)
499.50	19.03	(N/A)
499.60	19.67	(N/A)
499.70	20.32	(N/A)
499.80	20.98	(N/A)
499.90	21.64	(N/A)

Subsection: Composite Rating Curve

Label: Composite Outlet Structure - 1

Return Event: 15 years

Storm Event: MoDOT Curves for O'Fallon - 15 Year

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
500.00	22.31	(N/A)
500.10	22.98	(N/A)
500.20	23.67	(N/A)
500.30	24.35	(N/A)
500.40	25.05	(N/A)
500.50	25.75	(N/A)
500.60	26.46	(N/A)
500.70	27.18	(N/A)
500.80	27.90	(N/A)
500.90	28.63	(N/A)
501.00	29.37	(N/A)
501.10	30.11	(N/A)
501.20	30.86	(N/A)
501.30	31.61	(N/A)
501.40	32.37	(N/A)
501.50	33.14	(N/A)
501.60	33.91	(N/A)
501.70	34.69	(N/A)
501.80	35.48	(N/A)
501.90	36.27	(N/A)
502.00	37.06	(N/A)

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
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Composite Outflow Summary

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
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Requested Pond Water Surface Elevations	
Minimum (Headwater)	495.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	502.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Irregular Weir	Weir - 1	Forward	TW	495.00	502.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	502.00
9.66	502.00
9.67	495.00
10.33	495.00
10.34	502.00
20.00	502.00

Lowest Elevation	495.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances

Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
495.00	0.00	(N/A)
495.10	0.06	(N/A)
495.20	0.18	(N/A)
495.30	0.33	(N/A)
495.40	0.50	(N/A)
495.50	0.70	(N/A)
495.60	0.92	(N/A)
495.70	1.16	(N/A)
495.80	1.42	(N/A)
495.90	1.69	(N/A)
496.00	1.98	(N/A)
496.10	2.29	(N/A)
496.20	2.61	(N/A)
496.30	2.94	(N/A)
496.40	3.29	(N/A)
496.50	3.65	(N/A)
496.60	4.02	(N/A)
496.70	4.40	(N/A)
496.80	4.79	(N/A)
496.90	5.20	(N/A)
497.00	5.62	(N/A)
497.10	6.04	(N/A)
497.20	6.48	(N/A)
497.30	6.93	(N/A)
497.40	7.39	(N/A)
497.50	7.86	(N/A)
497.60	8.33	(N/A)
497.70	8.82	(N/A)
497.80	9.32	(N/A)
497.90	9.82	(N/A)
498.00	10.34	(N/A)
498.10	10.86	(N/A)
498.20	11.39	(N/A)
498.30	11.93	(N/A)
498.40	12.48	(N/A)
498.50	13.03	(N/A)
498.60	13.60	(N/A)
498.70	14.17	(N/A)
498.80	14.75	(N/A)
498.90	15.34	(N/A)
499.00	15.94	(N/A)
499.10	16.54	(N/A)
499.20	17.15	(N/A)
499.30	17.77	(N/A)
499.40	18.40	(N/A)
499.50	19.03	(N/A)
499.60	19.67	(N/A)
499.70	20.32	(N/A)
499.80	20.98	(N/A)
499.90	21.64	(N/A)

Subsection: Composite Rating Curve

Label: Composite Outlet Structure - 1

Return Event: 25 years

Storm Event: MoDOT Curves for O'Fallon - 25 Year

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
500.00	22.31	(N/A)
500.10	22.98	(N/A)
500.20	23.67	(N/A)
500.30	24.35	(N/A)
500.40	25.05	(N/A)
500.50	25.75	(N/A)
500.60	26.46	(N/A)
500.70	27.18	(N/A)
500.80	27.90	(N/A)
500.90	28.63	(N/A)
501.00	29.37	(N/A)
501.10	30.11	(N/A)
501.20	30.86	(N/A)
501.30	31.61	(N/A)
501.40	32.37	(N/A)
501.50	33.14	(N/A)
501.60	33.91	(N/A)
501.70	34.69	(N/A)
501.80	35.48	(N/A)
501.90	36.27	(N/A)
502.00	37.06	(N/A)

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
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Composite Outflow Summary

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
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0.00	Weir - 1

Requested Pond Water Surface Elevations	
Minimum (Headwater)	495.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	502.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Irregular Weir	Weir - 1	Forward	TW	495.00	502.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	502.00
9.66	502.00
9.67	495.00
10.33	495.00
10.34	502.00
20.00	502.00

Lowest Elevation	495.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances

Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
495.00	0.00	(N/A)
495.10	0.06	(N/A)
495.20	0.18	(N/A)
495.30	0.33	(N/A)
495.40	0.50	(N/A)
495.50	0.70	(N/A)
495.60	0.92	(N/A)
495.70	1.16	(N/A)
495.80	1.42	(N/A)
495.90	1.69	(N/A)
496.00	1.98	(N/A)
496.10	2.29	(N/A)
496.20	2.61	(N/A)
496.30	2.94	(N/A)
496.40	3.29	(N/A)
496.50	3.65	(N/A)
496.60	4.02	(N/A)
496.70	4.40	(N/A)
496.80	4.79	(N/A)
496.90	5.20	(N/A)
497.00	5.62	(N/A)
497.10	6.04	(N/A)
497.20	6.48	(N/A)
497.30	6.93	(N/A)
497.40	7.39	(N/A)
497.50	7.86	(N/A)
497.60	8.33	(N/A)
497.70	8.82	(N/A)
497.80	9.32	(N/A)
497.90	9.82	(N/A)
498.00	10.34	(N/A)
498.10	10.86	(N/A)
498.20	11.39	(N/A)
498.30	11.93	(N/A)
498.40	12.48	(N/A)
498.50	13.03	(N/A)
498.60	13.60	(N/A)
498.70	14.17	(N/A)
498.80	14.75	(N/A)
498.90	15.34	(N/A)
499.00	15.94	(N/A)
499.10	16.54	(N/A)
499.20	17.15	(N/A)
499.30	17.77	(N/A)
499.40	18.40	(N/A)
499.50	19.03	(N/A)
499.60	19.67	(N/A)
499.70	20.32	(N/A)
499.80	20.98	(N/A)
499.90	21.64	(N/A)

Subsection: Composite Rating Curve

Label: Composite Outlet Structure - 1

Return Event: 100 years

Storm Event: MoDOT Curves for O'Fallon - 100 Year

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
500.00	22.31	(N/A)
500.10	22.98	(N/A)
500.20	23.67	(N/A)
500.30	24.35	(N/A)
500.40	25.05	(N/A)
500.50	25.75	(N/A)
500.60	26.46	(N/A)
500.70	27.18	(N/A)
500.80	27.90	(N/A)
500.90	28.63	(N/A)
501.00	29.37	(N/A)
501.10	30.11	(N/A)
501.20	30.86	(N/A)
501.30	31.61	(N/A)
501.40	32.37	(N/A)
501.50	33.14	(N/A)
501.60	33.91	(N/A)
501.70	34.69	(N/A)
501.80	35.48	(N/A)
501.90	36.27	(N/A)
502.00	37.06	(N/A)

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
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Composite Outflow Summary

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
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Peak Discharge	8.96 ft³/s
Time to Peak	0.800 hours
Hydrograph Volume	1.368 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.02	0.08	0.27
0.250	1.16	1.91	2.79	3.72
0.500	5.61	6.55	7.44	8.16
0.750	8.92	8.96	8.78	8.46
1.000	7.74	7.41	7.10	6.80
1.250	6.25	5.99	5.75	5.52
1.500	5.08	4.88	4.69	4.51
1.750	4.17	4.01	3.86	3.72
2.000	3.45	3.32	3.20	3.09
2.250	2.88	2.78	2.68	2.59
2.500	2.42	2.33	2.26	2.18
2.750	2.04	1.98	1.92	1.86
3.000	1.74	1.69	1.64	1.59
3.250	1.49	1.45	1.41	1.37
3.500	1.29	1.25	1.22	1.18
3.750	1.12	1.09	1.06	1.03
4.000	0.98	0.95	0.92	0.90
4.250	0.86	0.83	0.81	0.79
4.500	0.75	0.74	0.72	0.70
4.750	0.67	0.65	0.64	0.62
5.000	0.59	0.58	0.57	0.55
5.250	0.53	0.52	0.51	0.49
5.500	0.47	0.47	0.46	0.45
5.750	0.43	0.42	0.41	0.40
6.000	0.39	0.38	0.37	0.36
6.250	0.35	0.34	0.33	0.33
6.500	0.32	0.31	0.30	0.30
6.750	0.29	0.28	0.28	0.27
7.000	0.26	0.26	0.26	0.25
7.250	0.24	0.24	0.23	0.23
7.500	0.22	0.22	0.21	0.21
7.750	0.20	0.20	0.20	0.19
8.000	0.19	0.18	0.18	0.18
8.250	0.17	0.17	0.17	0.16
8.500	0.16	0.16	0.16	0.15
8.750	0.15	0.15	0.15	0.14
9.000	0.14	0.14	0.14	0.13
9.250	0.13	0.13	0.13	0.13
9.500	0.12	0.12	0.12	0.12
9.750	0.11	0.11	0.11	0.11
10.000	0.11	0.10	0.10	0.10
10.250	0.10	0.10	0.10	0.09
10.500	0.09	0.09	0.09	0.09
10.750	0.09	0.08	0.08	0.08

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
11.000	0.08	0.08	0.08	0.08
11.250	0.08	0.07	0.07	0.07
11.500	0.07	0.07	0.07	0.07
11.750	0.07	0.06	0.06	0.06
12.000	0.06	0.06	0.06	0.06
12.250	0.06	0.06	0.06	0.06
12.500	0.06	0.06	0.06	0.06
12.750	0.06	0.05	0.05	0.05
13.000	0.05	0.05	0.05	0.05
13.250	0.05	0.05	0.05	0.05
13.500	0.05	0.05	0.05	0.05
13.750	0.05	0.05	0.05	0.05
14.000	0.05	0.05	0.04	0.04
14.250	0.04	0.04	0.04	0.04
14.500	0.04	0.04	0.04	0.04
14.750	0.04	0.04	0.04	0.04
15.000	0.04	0.04	0.04	0.04
15.250	0.04	0.04	0.04	0.04
15.500	0.04	0.04	0.04	0.04
15.750	0.03	0.03	0.03	0.03
16.000	0.03	0.03	0.03	0.03
16.250	0.03	0.03	0.03	0.03
16.500	0.03	0.03	0.03	0.03
16.750	0.03	0.03	0.03	0.03
17.000	0.03	0.03	0.03	0.03
17.250	0.03	0.03	0.03	0.03
17.500	0.03	0.03	0.03	0.03
17.750	0.03	0.03	0.03	0.03
18.000	0.02	0.02	0.02	0.02
18.250	0.02	0.02	0.02	0.02
18.500	0.02	0.02	0.02	0.02
18.750	0.02	0.02	0.02	0.02
19.000	0.02	0.02	0.02	0.02
19.250	0.02	0.02	0.02	0.02
19.500	0.02	0.02	0.02	0.02
19.750	0.02	0.02	0.02	0.02
20.000	0.02	0.02	0.02	0.02
20.250	0.02	0.02	0.02	0.02
20.500	0.02	0.02	0.02	0.02
20.750	0.02	0.02	0.02	0.02
21.000	0.02	0.02	0.02	0.02
21.250	0.02	0.01	0.01	0.01
21.500	0.01	0.01	0.01	0.01
21.750	0.01	0.01	0.01	0.01
22.000	0.01	0.01	0.01	0.01
22.250	0.01	0.01	0.01	0.01
22.500	0.01	0.01	0.01	0.01
22.750	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft³/s)
0.61
4.66
8.66
8.09
6.52
5.29
4.34
3.58
2.98
2.50
2.11
1.80
1.54
1.33
1.15
1.00
0.88
0.77
0.68
0.61
0.54
0.48
0.44
0.39
0.36
0.32
0.29
0.27
0.25
0.23
0.21
0.19
0.17
0.16
0.15
0.14
0.13
0.12
0.12
0.11
0.10
0.09
0.09

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.08
0.08
0.07
0.07
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.04
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.01
0.01
0.01
0.01
0.01
0.01
0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.01
0.01
0.01
0.01
(N/A)

Peak Discharge	17.28 ft³/s
Time to Peak	0.850 hours
Hydrograph Volume	2.433 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.03	0.16	0.53
0.250	2.23	3.63	5.23	6.88
0.500	10.14	11.72	13.26	14.74
0.750	16.81	17.24	17.28	16.97
1.000	15.57	14.84	14.16	13.51
1.250	12.30	11.74	11.21	10.71
1.500	9.78	9.35	8.94	8.55
1.750	7.83	7.49	7.18	6.87
2.000	6.31	6.05	5.81	5.57
2.250	5.13	4.93	4.74	4.55
2.500	4.21	4.05	3.90	3.75
2.750	3.48	3.35	3.23	3.12
3.000	2.90	2.80	2.70	2.61
3.250	2.44	2.35	2.28	2.20
3.500	2.06	1.99	1.93	1.87
3.750	1.75	1.70	1.65	1.60
4.000	1.50	1.46	1.42	1.38
4.250	1.30	1.26	1.23	1.19
4.500	1.13	1.10	1.07	1.04
4.750	0.98	0.96	0.93	0.91
5.000	0.86	0.84	0.82	0.80
5.250	0.76	0.74	0.72	0.70
5.500	0.67	0.66	0.64	0.63
5.750	0.60	0.58	0.57	0.56
6.000	0.53	0.52	0.51	0.50
6.250	0.48	0.47	0.46	0.45
6.500	0.43	0.42	0.41	0.40
6.750	0.39	0.38	0.37	0.36
7.000	0.35	0.34	0.34	0.33
7.250	0.32	0.31	0.31	0.30
7.500	0.29	0.29	0.28	0.28
7.750	0.27	0.26	0.26	0.25
8.000	0.24	0.24	0.23	0.23
8.250	0.22	0.22	0.22	0.21
8.500	0.20	0.20	0.20	0.19
8.750	0.19	0.18	0.18	0.18
9.000	0.17	0.17	0.17	0.17
9.250	0.16	0.16	0.16	0.15
9.500	0.15	0.15	0.15	0.14
9.750	0.14	0.14	0.14	0.13
10.000	0.13	0.13	0.13	0.13
10.250	0.12	0.12	0.12	0.12
10.500	0.11	0.11	0.11	0.11
10.750	0.11	0.10	0.10	0.10

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.000	0.10	0.10	0.10	0.10
11.250	0.09	0.09	0.09	0.09
11.500	0.09	0.09	0.08	0.08
11.750	0.08	0.08	0.08	0.08
12.000	0.08	0.07	0.07	0.07
12.250	0.07	0.07	0.07	0.07
12.500	0.07	0.06	0.06	0.06
12.750	0.06	0.06	0.06	0.06
13.000	0.06	0.06	0.06	0.06
13.250	0.06	0.06	0.06	0.06
13.500	0.06	0.05	0.05	0.05
13.750	0.05	0.05	0.05	0.05
14.000	0.05	0.05	0.05	0.05
14.250	0.05	0.05	0.05	0.05
14.500	0.05	0.05	0.05	0.05
14.750	0.05	0.05	0.04	0.04
15.000	0.04	0.04	0.04	0.04
15.250	0.04	0.04	0.04	0.04
15.500	0.04	0.04	0.04	0.04
15.750	0.04	0.04	0.04	0.04
16.000	0.04	0.04	0.04	0.04
16.250	0.04	0.04	0.04	0.04
16.500	0.03	0.03	0.03	0.03
16.750	0.03	0.03	0.03	0.03
17.000	0.03	0.03	0.03	0.03
17.250	0.03	0.03	0.03	0.03
17.500	0.03	0.03	0.03	0.03
17.750	0.03	0.03	0.03	0.03
18.000	0.03	0.03	0.03	0.03
18.250	0.03	0.03	0.03	0.03
18.500	0.03	0.03	0.03	0.03
18.750	0.02	0.02	0.02	0.02
19.000	0.02	0.02	0.02	0.02
19.250	0.02	0.02	0.02	0.02
19.500	0.02	0.02	0.02	0.02
19.750	0.02	0.02	0.02	0.02
20.000	0.02	0.02	0.02	0.02
20.250	0.02	0.02	0.02	0.02
20.500	0.02	0.02	0.02	0.02
20.750	0.02	0.02	0.02	0.02
21.000	0.02	0.02	0.02	0.02
21.250	0.02	0.02	0.02	0.02
21.500	0.02	0.02	0.02	0.02
21.750	0.02	0.02	0.02	0.02
22.000	0.02	0.01	0.01	0.01
22.250	0.01	0.01	0.01	0.01
22.500	0.01	0.01	0.01	0.01
22.750	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft^3/s)
1.20
8.52
15.98
16.33
12.89
10.23
8.18
6.59
5.35
4.38
3.61
3.01
2.52
2.13
1.81
1.55
1.34
1.16
1.01
0.88
0.78
0.69
0.61
0.55
0.49
0.44
0.40
0.36
0.32
0.30
0.27
0.25
0.23
0.21
0.19
0.17
0.16
0.15
0.14
0.13
0.12
0.12
0.11

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.10
0.09
0.09
0.08
0.08
0.07
0.07
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.04
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.01
0.01
0.01
0.01

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.01
0.01
0.01
0.01
(N/A)

Peak Discharge	20.65 ft³/s
Time to Peak	0.850 hours
Hydrograph Volume	2.878 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.03	0.19	0.63
0.250	2.63	4.26	6.12	8.01
0.500	11.73	13.53	15.26	16.93
0.750	19.65	20.37	20.65	20.51
1.000	19.13	18.24	17.38	16.57
1.250	15.06	14.37	13.71	13.08
1.500	11.91	11.37	10.86	10.38
1.750	9.48	9.06	8.67	8.29
2.000	7.59	7.27	6.97	6.67
2.250	6.13	5.88	5.64	5.42
2.500	4.99	4.80	4.61	4.43
2.750	4.10	3.94	3.80	3.66
3.000	3.39	3.27	3.15	3.04
3.250	2.83	2.73	2.64	2.55
3.500	2.38	2.30	2.22	2.15
3.750	2.01	1.95	1.89	1.83
4.000	1.72	1.66	1.61	1.57
4.250	1.47	1.43	1.39	1.35
4.500	1.27	1.24	1.20	1.17
4.750	1.10	1.08	1.05	1.02
5.000	0.96	0.94	0.91	0.89
5.250	0.85	0.83	0.80	0.78
5.500	0.75	0.73	0.71	0.69
5.750	0.66	0.65	0.63	0.62
6.000	0.59	0.58	0.56	0.55
6.250	0.52	0.51	0.50	0.49
6.500	0.47	0.46	0.45	0.44
6.750	0.42	0.42	0.41	0.40
7.000	0.38	0.37	0.37	0.36
7.250	0.35	0.34	0.33	0.32
7.500	0.31	0.31	0.30	0.30
7.750	0.29	0.28	0.28	0.27
8.000	0.26	0.26	0.25	0.25
8.250	0.24	0.24	0.23	0.23
8.500	0.22	0.22	0.21	0.21
8.750	0.20	0.20	0.19	0.19
9.000	0.18	0.18	0.18	0.18
9.250	0.17	0.17	0.17	0.16
9.500	0.16	0.16	0.15	0.15
9.750	0.15	0.15	0.14	0.14
10.000	0.14	0.14	0.13	0.13
10.250	0.13	0.13	0.13	0.12
10.500	0.12	0.12	0.12	0.12
10.750	0.11	0.11	0.11	0.11

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
11.000	0.11	0.10	0.10	0.10
11.250	0.10	0.10	0.10	0.09
11.500	0.09	0.09	0.09	0.09
11.750	0.09	0.08	0.08	0.08
12.000	0.08	0.08	0.08	0.08
12.250	0.07	0.07	0.07	0.07
12.500	0.07	0.07	0.07	0.07
12.750	0.06	0.06	0.06	0.06
13.000	0.06	0.06	0.06	0.06
13.250	0.06	0.06	0.06	0.06
13.500	0.06	0.06	0.06	0.06
13.750	0.05	0.05	0.05	0.05
14.000	0.05	0.05	0.05	0.05
14.250	0.05	0.05	0.05	0.05
14.500	0.05	0.05	0.05	0.05
14.750	0.05	0.05	0.05	0.05
15.000	0.05	0.04	0.04	0.04
15.250	0.04	0.04	0.04	0.04
15.500	0.04	0.04	0.04	0.04
15.750	0.04	0.04	0.04	0.04
16.000	0.04	0.04	0.04	0.04
16.250	0.04	0.04	0.04	0.04
16.500	0.04	0.04	0.04	0.04
16.750	0.03	0.03	0.03	0.03
17.000	0.03	0.03	0.03	0.03
17.250	0.03	0.03	0.03	0.03
17.500	0.03	0.03	0.03	0.03
17.750	0.03	0.03	0.03	0.03
18.000	0.03	0.03	0.03	0.03
18.250	0.03	0.03	0.03	0.03
18.500	0.03	0.03	0.03	0.03
18.750	0.03	0.03	0.03	0.02
19.000	0.02	0.02	0.02	0.02
19.250	0.02	0.02	0.02	0.02
19.500	0.02	0.02	0.02	0.02
19.750	0.02	0.02	0.02	0.02
20.000	0.02	0.02	0.02	0.02
20.250	0.02	0.02	0.02	0.02
20.500	0.02	0.02	0.02	0.02
20.750	0.02	0.02	0.02	0.02
21.000	0.02	0.02	0.02	0.02
21.250	0.02	0.02	0.02	0.02
21.500	0.02	0.02	0.02	0.02
21.750	0.02	0.02	0.02	0.02
22.000	0.02	0.02	0.02	0.02
22.250	0.01	0.01	0.01	0.01
22.500	0.01	0.01	0.01	0.01
22.750	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft^3/s)
1.42
9.89
18.46
19.96
15.80
12.48
9.92
7.93
6.40
5.20
4.26
3.52
2.93
2.46
2.08
1.77
1.52
1.31
1.14
0.99
0.87
0.77
0.68
0.60
0.54
0.48
0.43
0.39
0.35
0.32
0.29
0.27
0.24
0.22
0.21
0.19
0.17
0.16
0.15
0.14
0.13
0.12
0.11

Subsection: Diverted Hydrograph

Label: Outlet-1

Return Event: 25 years

Storm Event: MoDOT Curves for O'Fallon - 25 Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft³/s)
0.11
0.10
0.09
0.09
0.08
0.08
0.07
0.07
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.01
0.01
0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.01
0.01
0.01
0.01
(N/A)

Peak Discharge	27.71 ft³/s
Time to Peak	0.950 hours
Hydrograph Volume	4.030 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.04	0.27	0.86
0.250	3.56	5.72	8.15	10.60
0.500	15.34	17.60	19.77	21.83
0.750	25.26	26.47	27.26	27.66
1.000	27.42	26.78	25.92	24.99
1.250	23.02	21.96	20.93	19.95
1.500	18.12	17.28	16.47	15.70
1.750	14.28	13.62	13.00	12.40
2.000	11.31	10.80	10.32	9.86
2.250	9.01	8.62	8.24	7.89
2.500	7.23	6.93	6.64	6.36
2.750	5.85	5.61	5.39	5.17
3.000	4.77	4.59	4.41	4.24
3.250	3.93	3.78	3.64	3.50
3.500	3.25	3.14	3.03	2.92
3.750	2.72	2.63	2.54	2.45
4.000	2.29	2.21	2.14	2.07
4.250	1.94	1.88	1.82	1.76
4.500	1.66	1.61	1.56	1.51
4.750	1.42	1.38	1.34	1.31
5.000	1.23	1.20	1.16	1.13
5.250	1.07	1.04	1.01	0.99
5.500	0.93	0.91	0.89	0.87
5.750	0.82	0.80	0.78	0.76
6.000	0.73	0.71	0.69	0.67
6.250	0.64	0.63	0.61	0.60
6.500	0.57	0.56	0.55	0.53
6.750	0.51	0.50	0.49	0.48
7.000	0.46	0.45	0.44	0.43
7.250	0.41	0.41	0.40	0.39
7.500	0.37	0.37	0.36	0.35
7.750	0.34	0.33	0.32	0.32
8.000	0.31	0.30	0.30	0.29
8.250	0.28	0.28	0.27	0.27
8.500	0.26	0.25	0.25	0.24
8.750	0.24	0.23	0.23	0.22
9.000	0.22	0.21	0.21	0.20
9.250	0.20	0.19	0.19	0.19
9.500	0.18	0.18	0.18	0.17
9.750	0.17	0.17	0.16	0.16
10.000	0.16	0.15	0.15	0.15
10.250	0.15	0.14	0.14	0.14
10.500	0.14	0.13	0.13	0.13
10.750	0.13	0.13	0.12	0.12

Subsection: Diverted Hydrograph
Label: Outlet-1

Return Event: 100 years
Storm Event: MoDOT Curves for O'Fallon - 100 Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.000	0.12	0.12	0.12	0.11
11.250	0.11	0.11	0.11	0.11
11.500	0.10	0.10	0.10	0.10
11.750	0.10	0.10	0.09	0.09
12.000	0.09	0.09	0.09	0.09
12.250	0.08	0.08	0.08	0.08
12.500	0.08	0.08	0.08	0.08
12.750	0.07	0.07	0.07	0.07
13.000	0.07	0.07	0.07	0.07
13.250	0.06	0.06	0.06	0.06
13.500	0.06	0.06	0.06	0.06
13.750	0.06	0.06	0.06	0.06
14.000	0.06	0.06	0.06	0.06
14.250	0.05	0.05	0.05	0.05
14.500	0.05	0.05	0.05	0.05
14.750	0.05	0.05	0.05	0.05
15.000	0.05	0.05	0.05	0.05
15.250	0.05	0.05	0.05	0.05
15.500	0.04	0.04	0.04	0.04
15.750	0.04	0.04	0.04	0.04
16.000	0.04	0.04	0.04	0.04
16.250	0.04	0.04	0.04	0.04
16.500	0.04	0.04	0.04	0.04
16.750	0.04	0.04	0.04	0.04
17.000	0.04	0.04	0.04	0.03
17.250	0.03	0.03	0.03	0.03
17.500	0.03	0.03	0.03	0.03
17.750	0.03	0.03	0.03	0.03
18.000	0.03	0.03	0.03	0.03
18.250	0.03	0.03	0.03	0.03
18.500	0.03	0.03	0.03	0.03
18.750	0.03	0.03	0.03	0.03
19.000	0.03	0.03	0.03	0.03
19.250	0.03	0.03	0.02	0.02
19.500	0.02	0.02	0.02	0.02
19.750	0.02	0.02	0.02	0.02
20.000	0.02	0.02	0.02	0.02
20.250	0.02	0.02	0.02	0.02
20.500	0.02	0.02	0.02	0.02
20.750	0.02	0.02	0.02	0.02
21.000	0.02	0.02	0.02	0.02
21.250	0.02	0.02	0.02	0.02
21.500	0.02	0.02	0.02	0.02
21.750	0.02	0.02	0.02	0.02
22.000	0.02	0.02	0.02	0.02
22.250	0.02	0.02	0.02	0.02
22.500	0.02	0.02	0.02	0.02
22.750	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft^3/s)
1.94
13.00
23.71
27.71
24.02
19.01
14.97
11.84
9.42
7.55
6.10
4.97
4.08
3.38
2.82
2.37
2.01
1.71
1.47
1.27
1.10
0.96
0.84
0.74
0.66
0.59
0.52
0.47
0.42
0.38
0.34
0.31
0.29
0.26
0.24
0.22
0.20
0.18
0.17
0.16
0.15
0.14
0.13

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.12
0.11
0.11
0.10
0.09
0.09
0.08
0.07
0.07
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.01
0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.01
0.01
0.01
0.01
(N/A)

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	495.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ac-ft)	Area (acres)	Infiltration (ft³/s)
495.00	0.00	0.000	0.337	0.00
495.10	0.06	0.034	0.341	0.00
495.20	0.18	0.068	0.345	0.00
495.30	0.33	0.103	0.349	0.00
495.40	0.50	0.138	0.354	0.00
495.50	0.70	0.174	0.358	0.00
495.60	0.92	0.210	0.362	0.00
495.70	1.16	0.246	0.366	0.00
495.80	1.42	0.283	0.370	0.00
495.90	1.69	0.320	0.375	0.00
496.00	1.98	0.358	0.379	0.00
496.10	2.29	0.396	0.383	0.00
496.20	2.61	0.434	0.388	0.00
496.30	2.94	0.473	0.392	0.00
496.40	3.29	0.513	0.396	0.00
496.50	3.65	0.553	0.401	0.00
496.60	4.02	0.593	0.405	0.00
496.70	4.40	0.634	0.410	0.00
496.80	4.79	0.675	0.414	0.00
496.90	5.20	0.717	0.418	0.00
497.00	5.62	0.759	0.423	0.00
497.10	6.04	0.801	0.428	0.00
497.20	6.48	0.844	0.432	0.00
497.30	6.93	0.888	0.437	0.00
497.40	7.39	0.931	0.442	0.00
497.50	7.86	0.976	0.446	0.00
497.60	8.33	1.021	0.451	0.00
497.70	8.82	1.066	0.456	0.00
497.80	9.32	1.112	0.460	0.00
497.90	9.82	1.158	0.465	0.00
498.00	10.34	1.205	0.470	0.00
498.10	10.86	1.252	0.475	0.00
498.20	11.39	1.300	0.480	0.00
498.30	11.93	1.348	0.485	0.00
498.40	12.48	1.397	0.490	0.00
498.50	13.03	1.446	0.495	0.00

Elevation (ft)	Outflow (ft^3/s)	Storage (ac-ft)	Area (acres)	Infiltration (ft^3/s)
498.60	13.60	1.496	0.500	0.00
498.70	14.17	1.546	0.505	0.00
498.80	14.75	1.597	0.510	0.00
498.90	15.34	1.648	0.515	0.00
499.00	15.94	1.700	0.520	0.00
499.10	16.54	1.752	0.526	0.00
499.20	17.15	1.805	0.531	0.00
499.30	17.77	1.858	0.537	0.00
499.40	18.40	1.912	0.543	0.00
499.50	19.03	1.967	0.549	0.00
499.60	19.67	2.022	0.554	0.00
499.70	20.32	2.078	0.560	0.00
499.80	20.98	2.134	0.566	0.00
499.90	21.64	2.191	0.572	0.00
500.00	22.31	2.248	0.578	0.00
500.10	22.98	2.308	0.623	0.00
500.20	23.67	2.373	0.669	0.00
500.30	24.35	2.442	0.717	0.00
500.40	25.05	2.516	0.767	0.00
500.50	25.75	2.596	0.818	0.00
500.60	26.46	2.680	0.871	0.00
500.70	27.18	2.770	0.926	0.00
500.80	27.90	2.865	0.982	0.00
500.90	28.63	2.967	1.040	0.00
501.00	29.37	3.074	1.100	0.00
501.10	30.11	3.187	1.160	0.00
501.20	30.86	3.306	1.222	0.00
501.30	31.61	3.431	1.285	0.00
501.40	32.37	3.563	1.350	0.00
501.50	33.14	3.701	1.417	0.00
501.60	33.91	3.846	1.485	0.00
501.70	34.69	3.998	1.554	0.00
501.80	35.48	4.157	1.626	0.00
501.90	36.27	4.323	1.699	0.00
502.00	37.06	4.497	1.773	0.00

Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
0.00	0.00
0.06	16.47
0.18	33.19
0.33	50.15
0.50	67.34
0.70	84.75
0.92	102.38
1.16	120.24
1.42	138.32
1.69	156.63
1.98	175.16
2.29	193.91
2.61	212.88

Subsection: Elevation-Volume-Flow Table (Pond)

Label: POND 1

Return Event: 2 years

Storm Event: MoDOT Curves for O'Fallon - 2 Year

Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
2.94	232.08
3.29	251.50
3.65	271.15
4.02	291.02
4.40	311.12
4.79	331.44
5.20	352.00
5.62	372.78
6.04	393.79
6.48	415.03
6.93	436.51
7.39	458.23
7.86	480.18
8.33	502.36
8.82	524.79
9.32	547.45
9.82	570.36
10.34	593.50
10.86	616.89
11.39	640.52
11.93	664.41
12.48	688.54
13.03	712.91
13.60	737.54
14.17	762.42
14.75	787.55
15.34	812.94
15.94	838.58
16.54	864.49
17.15	890.68
17.77	917.16
18.40	943.92
19.03	970.96
19.67	998.30
20.32	1,025.92
20.98	1,053.83
21.64	1,082.04
22.31	1,110.54
22.98	1,140.27
23.67	1,172.21
24.35	1,206.43
25.05	1,243.04
25.75	1,282.09
26.46	1,323.68
27.18	1,367.88
27.90	1,414.77
28.63	1,464.44
29.37	1,516.96
30.11	1,572.39
30.86	1,630.78

Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
31.61	1,692.19
32.37	1,756.72
33.14	1,824.43
33.91	1,895.40
34.69	1,969.71
35.48	2,047.45
36.27	2,128.68
37.06	2,213.48

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	495.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ac-ft)	Area (acres)	Infiltration (ft³/s)
495.00	0.00	0.000	0.337	0.00
495.10	0.06	0.034	0.341	0.00
495.20	0.18	0.068	0.345	0.00
495.30	0.33	0.103	0.349	0.00
495.40	0.50	0.138	0.354	0.00
495.50	0.70	0.174	0.358	0.00
495.60	0.92	0.210	0.362	0.00
495.70	1.16	0.246	0.366	0.00
495.80	1.42	0.283	0.370	0.00
495.90	1.69	0.320	0.375	0.00
496.00	1.98	0.358	0.379	0.00
496.10	2.29	0.396	0.383	0.00
496.20	2.61	0.434	0.388	0.00
496.30	2.94	0.473	0.392	0.00
496.40	3.29	0.513	0.396	0.00
496.50	3.65	0.553	0.401	0.00
496.60	4.02	0.593	0.405	0.00
496.70	4.40	0.634	0.410	0.00
496.80	4.79	0.675	0.414	0.00
496.90	5.20	0.717	0.418	0.00
497.00	5.62	0.759	0.423	0.00
497.10	6.04	0.801	0.428	0.00
497.20	6.48	0.844	0.432	0.00
497.30	6.93	0.888	0.437	0.00
497.40	7.39	0.931	0.442	0.00
497.50	7.86	0.976	0.446	0.00
497.60	8.33	1.021	0.451	0.00
497.70	8.82	1.066	0.456	0.00
497.80	9.32	1.112	0.460	0.00
497.90	9.82	1.158	0.465	0.00
498.00	10.34	1.205	0.470	0.00
498.10	10.86	1.252	0.475	0.00
498.20	11.39	1.300	0.480	0.00
498.30	11.93	1.348	0.485	0.00
498.40	12.48	1.397	0.490	0.00
498.50	13.03	1.446	0.495	0.00

Elevation (ft)	Outflow (ft³/s)	Storage (ac-ft)	Area (acres)	Infiltration (ft³/s)
498.60	13.60	1.496	0.500	0.00
498.70	14.17	1.546	0.505	0.00
498.80	14.75	1.597	0.510	0.00
498.90	15.34	1.648	0.515	0.00
499.00	15.94	1.700	0.520	0.00
499.10	16.54	1.752	0.526	0.00
499.20	17.15	1.805	0.531	0.00
499.30	17.77	1.858	0.537	0.00
499.40	18.40	1.912	0.543	0.00
499.50	19.03	1.967	0.549	0.00
499.60	19.67	2.022	0.554	0.00
499.70	20.32	2.078	0.560	0.00
499.80	20.98	2.134	0.566	0.00
499.90	21.64	2.191	0.572	0.00
500.00	22.31	2.248	0.578	0.00
500.10	22.98	2.308	0.623	0.00
500.20	23.67	2.373	0.669	0.00
500.30	24.35	2.442	0.717	0.00
500.40	25.05	2.516	0.767	0.00
500.50	25.75	2.596	0.818	0.00
500.60	26.46	2.680	0.871	0.00
500.70	27.18	2.770	0.926	0.00
500.80	27.90	2.865	0.982	0.00
500.90	28.63	2.967	1.040	0.00
501.00	29.37	3.074	1.100	0.00
501.10	30.11	3.187	1.160	0.00
501.20	30.86	3.306	1.222	0.00
501.30	31.61	3.431	1.285	0.00
501.40	32.37	3.563	1.350	0.00
501.50	33.14	3.701	1.417	0.00
501.60	33.91	3.846	1.485	0.00
501.70	34.69	3.998	1.554	0.00
501.80	35.48	4.157	1.626	0.00
501.90	36.27	4.323	1.699	0.00
502.00	37.06	4.497	1.773	0.00

Flow (Total) (ft³/s)	2S/t + O (ft³/s)
0.00	0.00
0.06	16.47
0.18	33.19
0.33	50.15
0.50	67.34
0.70	84.75
0.92	102.38
1.16	120.24
1.42	138.32
1.69	156.63
1.98	175.16
2.29	193.91
2.61	212.88

Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
2.94	232.08
3.29	251.50
3.65	271.15
4.02	291.02
4.40	311.12
4.79	331.44
5.20	352.00
5.62	372.78
6.04	393.79
6.48	415.03
6.93	436.51
7.39	458.23
7.86	480.18
8.33	502.36
8.82	524.79
9.32	547.45
9.82	570.36
10.34	593.50
10.86	616.89
11.39	640.52
11.93	664.41
12.48	688.54
13.03	712.91
13.60	737.54
14.17	762.42
14.75	787.55
15.34	812.94
15.94	838.58
16.54	864.49
17.15	890.68
17.77	917.16
18.40	943.92
19.03	970.96
19.67	998.30
20.32	1,025.92
20.98	1,053.83
21.64	1,082.04
22.31	1,110.54
22.98	1,140.27
23.67	1,172.21
24.35	1,206.43
25.05	1,243.04
25.75	1,282.09
26.46	1,323.68
27.18	1,367.88
27.90	1,414.77
28.63	1,464.44
29.37	1,516.96
30.11	1,572.39
30.86	1,630.78

Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
31.61	1,692.19
32.37	1,756.72
33.14	1,824.43
33.91	1,895.40
34.69	1,969.71
35.48	2,047.45
36.27	2,128.68
37.06	2,213.48

Infiltration	
Infiltration Method (Computed)	No Infiltration

Approximate Detention Times	
Time to Peak (Outflow + Infiltration, Peak to Peak Detention Time)	0.800 hours
Time to Peak (Inflow, Peak to Peak Detention Time)	0.300 hours
Detention Time (Peak to Peak)	0.500 hours

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	495.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	28.50 ft³/s	Time to Peak (Flow, In)	0.300 hours
Flow (Peak Outlet)	8.96 ft³/s	Time to Peak (Flow, Outlet)	0.800 hours

Elevation (Water Surface, Peak)	497.73 ft
Volume (Peak)	1.079 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	1.373 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	1.368 ac-ft
Volume (Retained)	0.005 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Approximate Detention Times	
Time to Peak (Outflow + Infiltration, Peak to Peak Detention Time)	0.850 hours
Time to Peak (Inflow, Peak to Peak Detention Time)	0.300 hours
Detention Time (Peak to Peak)	0.550 hours

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	495.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	45.40 ft³/s	Time to Peak (Flow, In)	0.300 hours
Flow (Peak Outlet)	17.28 ft³/s	Time to Peak (Flow, Outlet)	0.850 hours

Elevation (Water Surface, Peak)	499.22 ft
Volume (Peak)	1.816 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	2.439 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	2.433 ac-ft
Volume (Retained)	0.006 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Approximate Detention Times	
Time to Peak (Outflow + Infiltration, Peak to Peak Detention Time)	0.850 hours
Time to Peak (Inflow, Peak to Peak Detention Time)	0.300 hours
Detention Time (Peak to Peak)	0.550 hours

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	495.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	51.10 ft³/s	Time to Peak (Flow, In)	0.300 hours
Flow (Peak Outlet)	20.65 ft³/s	Time to Peak (Flow, Outlet)	0.850 hours

Elevation (Water Surface, Peak)	499.75 ft
Volume (Peak)	2.106 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	2.884 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	2.878 ac-ft
Volume (Retained)	0.006 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Approximate Detention Times	
Time to Peak (Outflow + Infiltration, Peak to Peak Detention Time)	0.950 hours
Time to Peak (Inflow, Peak to Peak Detention Time)	0.300 hours
Detention Time (Peak to Peak)	0.650 hours

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	495.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	63.78 ft³/s	Time to Peak (Flow, In)	0.300 hours
Flow (Peak Outlet)	27.71 ft³/s	Time to Peak (Flow, Outlet)	0.950 hours

Elevation (Water Surface, Peak)	500.77 ft
Volume (Peak)	2.839 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	4.037 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	4.030 ac-ft
Volume (Retained)	0.007 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Peak Discharge	8.96 ft³/s
Time to Peak	0.800 hours
Hydrograph Volume	1.368 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.02	0.08	0.27
0.250	1.16	1.91	2.79	3.72
0.500	5.61	6.55	7.44	8.16
0.750	8.92	8.96	8.78	8.46
1.000	7.74	7.41	7.10	6.80
1.250	6.25	5.99	5.75	5.52
1.500	5.08	4.88	4.69	4.51
1.750	4.17	4.01	3.86	3.72
2.000	3.45	3.32	3.20	3.09
2.250	2.88	2.78	2.68	2.59
2.500	2.42	2.33	2.26	2.18
2.750	2.04	1.98	1.92	1.86
3.000	1.74	1.69	1.64	1.59
3.250	1.49	1.45	1.41	1.37
3.500	1.29	1.25	1.22	1.18
3.750	1.12	1.09	1.06	1.03
4.000	0.98	0.95	0.92	0.90
4.250	0.86	0.83	0.81	0.79
4.500	0.75	0.74	0.72	0.70
4.750	0.67	0.65	0.64	0.62
5.000	0.59	0.58	0.57	0.55
5.250	0.53	0.52	0.51	0.49
5.500	0.47	0.47	0.46	0.45
5.750	0.43	0.42	0.41	0.40
6.000	0.39	0.38	0.37	0.36
6.250	0.35	0.34	0.33	0.33
6.500	0.32	0.31	0.30	0.30
6.750	0.29	0.28	0.28	0.27
7.000	0.26	0.26	0.26	0.25
7.250	0.24	0.24	0.23	0.23
7.500	0.22	0.22	0.21	0.21
7.750	0.20	0.20	0.20	0.19
8.000	0.19	0.18	0.18	0.18
8.250	0.17	0.17	0.17	0.16
8.500	0.16	0.16	0.16	0.15
8.750	0.15	0.15	0.15	0.14
9.000	0.14	0.14	0.14	0.13
9.250	0.13	0.13	0.13	0.13
9.500	0.12	0.12	0.12	0.12
9.750	0.11	0.11	0.11	0.11
10.000	0.11	0.10	0.10	0.10
10.250	0.10	0.10	0.10	0.09
10.500	0.09	0.09	0.09	0.09
10.750	0.09	0.08	0.08	0.08

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
11.000	0.08	0.08	0.08	0.08
11.250	0.08	0.07	0.07	0.07
11.500	0.07	0.07	0.07	0.07
11.750	0.07	0.06	0.06	0.06
12.000	0.06	0.06	0.06	0.06
12.250	0.06	0.06	0.06	0.06
12.500	0.06	0.06	0.06	0.06
12.750	0.06	0.05	0.05	0.05
13.000	0.05	0.05	0.05	0.05
13.250	0.05	0.05	0.05	0.05
13.500	0.05	0.05	0.05	0.05
13.750	0.05	0.05	0.05	0.05
14.000	0.05	0.05	0.04	0.04
14.250	0.04	0.04	0.04	0.04
14.500	0.04	0.04	0.04	0.04
14.750	0.04	0.04	0.04	0.04
15.000	0.04	0.04	0.04	0.04
15.250	0.04	0.04	0.04	0.04
15.500	0.04	0.04	0.04	0.04
15.750	0.03	0.03	0.03	0.03
16.000	0.03	0.03	0.03	0.03
16.250	0.03	0.03	0.03	0.03
16.500	0.03	0.03	0.03	0.03
16.750	0.03	0.03	0.03	0.03
17.000	0.03	0.03	0.03	0.03
17.250	0.03	0.03	0.03	0.03
17.500	0.03	0.03	0.03	0.03
17.750	0.03	0.03	0.03	0.03
18.000	0.02	0.02	0.02	0.02
18.250	0.02	0.02	0.02	0.02
18.500	0.02	0.02	0.02	0.02
18.750	0.02	0.02	0.02	0.02
19.000	0.02	0.02	0.02	0.02
19.250	0.02	0.02	0.02	0.02
19.500	0.02	0.02	0.02	0.02
19.750	0.02	0.02	0.02	0.02
20.000	0.02	0.02	0.02	0.02
20.250	0.02	0.02	0.02	0.02
20.500	0.02	0.02	0.02	0.02
20.750	0.02	0.02	0.02	0.02
21.000	0.02	0.02	0.02	0.02
21.250	0.02	0.01	0.01	0.01
21.500	0.01	0.01	0.01	0.01
21.750	0.01	0.01	0.01	0.01
22.000	0.01	0.01	0.01	0.01
22.250	0.01	0.01	0.01	0.01
22.500	0.01	0.01	0.01	0.01
22.750	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft^3/s)
0.61
4.66
8.66
8.09
6.52
5.29
4.34
3.58
2.98
2.50
2.11
1.80
1.54
1.33
1.15
1.00
0.88
0.77
0.68
0.61
0.54
0.48
0.44
0.39
0.36
0.32
0.29
0.27
0.25
0.23
0.21
0.19
0.17
0.16
0.15
0.14
0.13
0.12
0.12
0.11
0.10
0.09
0.09

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.08
0.08
0.07
0.07
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.04
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.01
0.01
0.01
0.01
0.01
0.01
0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.01
0.01
0.01
0.01
(N/A)

Peak Discharge	17.28 ft³/s
Time to Peak	0.850 hours
Hydrograph Volume	2.433 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.03	0.16	0.53
0.250	2.23	3.63	5.23	6.88
0.500	10.14	11.72	13.26	14.74
0.750	16.81	17.24	17.28	16.97
1.000	15.57	14.84	14.16	13.51
1.250	12.30	11.74	11.21	10.71
1.500	9.78	9.35	8.94	8.55
1.750	7.83	7.49	7.18	6.87
2.000	6.31	6.05	5.81	5.57
2.250	5.13	4.93	4.74	4.55
2.500	4.21	4.05	3.90	3.75
2.750	3.48	3.35	3.23	3.12
3.000	2.90	2.80	2.70	2.61
3.250	2.44	2.35	2.28	2.20
3.500	2.06	1.99	1.93	1.87
3.750	1.75	1.70	1.65	1.60
4.000	1.50	1.46	1.42	1.38
4.250	1.30	1.26	1.23	1.19
4.500	1.13	1.10	1.07	1.04
4.750	0.98	0.96	0.93	0.91
5.000	0.86	0.84	0.82	0.80
5.250	0.76	0.74	0.72	0.70
5.500	0.67	0.66	0.64	0.63
5.750	0.60	0.58	0.57	0.56
6.000	0.53	0.52	0.51	0.50
6.250	0.48	0.47	0.46	0.45
6.500	0.43	0.42	0.41	0.40
6.750	0.39	0.38	0.37	0.36
7.000	0.35	0.34	0.34	0.33
7.250	0.32	0.31	0.31	0.30
7.500	0.29	0.29	0.28	0.28
7.750	0.27	0.26	0.26	0.25
8.000	0.24	0.24	0.23	0.23
8.250	0.22	0.22	0.22	0.21
8.500	0.20	0.20	0.20	0.19
8.750	0.19	0.18	0.18	0.18
9.000	0.17	0.17	0.17	0.17
9.250	0.16	0.16	0.16	0.15
9.500	0.15	0.15	0.15	0.14
9.750	0.14	0.14	0.14	0.13
10.000	0.13	0.13	0.13	0.13
10.250	0.12	0.12	0.12	0.12
10.500	0.11	0.11	0.11	0.11
10.750	0.11	0.10	0.10	0.10

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.000	0.10	0.10	0.10	0.10
11.250	0.09	0.09	0.09	0.09
11.500	0.09	0.09	0.08	0.08
11.750	0.08	0.08	0.08	0.08
12.000	0.08	0.07	0.07	0.07
12.250	0.07	0.07	0.07	0.07
12.500	0.07	0.06	0.06	0.06
12.750	0.06	0.06	0.06	0.06
13.000	0.06	0.06	0.06	0.06
13.250	0.06	0.06	0.06	0.06
13.500	0.06	0.05	0.05	0.05
13.750	0.05	0.05	0.05	0.05
14.000	0.05	0.05	0.05	0.05
14.250	0.05	0.05	0.05	0.05
14.500	0.05	0.05	0.05	0.05
14.750	0.05	0.05	0.04	0.04
15.000	0.04	0.04	0.04	0.04
15.250	0.04	0.04	0.04	0.04
15.500	0.04	0.04	0.04	0.04
15.750	0.04	0.04	0.04	0.04
16.000	0.04	0.04	0.04	0.04
16.250	0.04	0.04	0.04	0.04
16.500	0.03	0.03	0.03	0.03
16.750	0.03	0.03	0.03	0.03
17.000	0.03	0.03	0.03	0.03
17.250	0.03	0.03	0.03	0.03
17.500	0.03	0.03	0.03	0.03
17.750	0.03	0.03	0.03	0.03
18.000	0.03	0.03	0.03	0.03
18.250	0.03	0.03	0.03	0.03
18.500	0.03	0.03	0.03	0.03
18.750	0.02	0.02	0.02	0.02
19.000	0.02	0.02	0.02	0.02
19.250	0.02	0.02	0.02	0.02
19.500	0.02	0.02	0.02	0.02
19.750	0.02	0.02	0.02	0.02
20.000	0.02	0.02	0.02	0.02
20.250	0.02	0.02	0.02	0.02
20.500	0.02	0.02	0.02	0.02
20.750	0.02	0.02	0.02	0.02
21.000	0.02	0.02	0.02	0.02
21.250	0.02	0.02	0.02	0.02
21.500	0.02	0.02	0.02	0.02
21.750	0.02	0.02	0.02	0.02
22.000	0.02	0.01	0.01	0.01
22.250	0.01	0.01	0.01	0.01
22.500	0.01	0.01	0.01	0.01
22.750	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft³/s)
1.20
8.52
15.98
16.33
12.89
10.23
8.18
6.59
5.35
4.38
3.61
3.01
2.52
2.13
1.81
1.55
1.34
1.16
1.01
0.88
0.78
0.69
0.61
0.55
0.49
0.44
0.40
0.36
0.32
0.30
0.27
0.25
0.23
0.21
0.19
0.17
0.16
0.15
0.14
0.13
0.12
0.12
0.11

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft³/s)
0.10
0.09
0.09
0.08
0.08
0.07
0.07
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.04
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.01
0.01
0.01
0.01

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft³/s)
0.01
0.01
0.01
0.01
(N/A)

Peak Discharge	20.65 ft^3/s
Time to Peak	0.850 hours
Hydrograph Volume	2.878 ac-ft

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
0.000	0.00	0.03	0.19	0.63
0.250	2.63	4.26	6.12	8.01
0.500	11.73	13.53	15.26	16.93
0.750	19.65	20.37	20.65	20.51
1.000	19.13	18.24	17.38	16.57
1.250	15.06	14.37	13.71	13.08
1.500	11.91	11.37	10.86	10.38
1.750	9.48	9.06	8.67	8.29
2.000	7.59	7.27	6.97	6.67
2.250	6.13	5.88	5.64	5.42
2.500	4.99	4.80	4.61	4.43
2.750	4.10	3.94	3.80	3.66
3.000	3.39	3.27	3.15	3.04
3.250	2.83	2.73	2.64	2.55
3.500	2.38	2.30	2.22	2.15
3.750	2.01	1.95	1.89	1.83
4.000	1.72	1.66	1.61	1.57
4.250	1.47	1.43	1.39	1.35
4.500	1.27	1.24	1.20	1.17
4.750	1.10	1.08	1.05	1.02
5.000	0.96	0.94	0.91	0.89
5.250	0.85	0.83	0.80	0.78
5.500	0.75	0.73	0.71	0.69
5.750	0.66	0.65	0.63	0.62
6.000	0.59	0.58	0.56	0.55
6.250	0.52	0.51	0.50	0.49
6.500	0.47	0.46	0.45	0.44
6.750	0.42	0.42	0.41	0.40
7.000	0.38	0.37	0.37	0.36
7.250	0.35	0.34	0.33	0.32
7.500	0.31	0.31	0.30	0.30
7.750	0.29	0.28	0.28	0.27
8.000	0.26	0.26	0.25	0.25
8.250	0.24	0.24	0.23	0.23
8.500	0.22	0.22	0.21	0.21
8.750	0.20	0.20	0.19	0.19
9.000	0.18	0.18	0.18	0.18
9.250	0.17	0.17	0.17	0.16
9.500	0.16	0.16	0.15	0.15
9.750	0.15	0.15	0.14	0.14
10.000	0.14	0.14	0.13	0.13
10.250	0.13	0.13	0.13	0.12
10.500	0.12	0.12	0.12	0.12
10.750	0.11	0.11	0.11	0.11

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.000	0.11	0.10	0.10	0.10
11.250	0.10	0.10	0.10	0.09
11.500	0.09	0.09	0.09	0.09
11.750	0.09	0.08	0.08	0.08
12.000	0.08	0.08	0.08	0.08
12.250	0.07	0.07	0.07	0.07
12.500	0.07	0.07	0.07	0.07
12.750	0.06	0.06	0.06	0.06
13.000	0.06	0.06	0.06	0.06
13.250	0.06	0.06	0.06	0.06
13.500	0.06	0.06	0.06	0.06
13.750	0.05	0.05	0.05	0.05
14.000	0.05	0.05	0.05	0.05
14.250	0.05	0.05	0.05	0.05
14.500	0.05	0.05	0.05	0.05
14.750	0.05	0.05	0.05	0.05
15.000	0.05	0.04	0.04	0.04
15.250	0.04	0.04	0.04	0.04
15.500	0.04	0.04	0.04	0.04
15.750	0.04	0.04	0.04	0.04
16.000	0.04	0.04	0.04	0.04
16.250	0.04	0.04	0.04	0.04
16.500	0.04	0.04	0.04	0.04
16.750	0.03	0.03	0.03	0.03
17.000	0.03	0.03	0.03	0.03
17.250	0.03	0.03	0.03	0.03
17.500	0.03	0.03	0.03	0.03
17.750	0.03	0.03	0.03	0.03
18.000	0.03	0.03	0.03	0.03
18.250	0.03	0.03	0.03	0.03
18.500	0.03	0.03	0.03	0.03
18.750	0.03	0.03	0.03	0.02
19.000	0.02	0.02	0.02	0.02
19.250	0.02	0.02	0.02	0.02
19.500	0.02	0.02	0.02	0.02
19.750	0.02	0.02	0.02	0.02
20.000	0.02	0.02	0.02	0.02
20.250	0.02	0.02	0.02	0.02
20.500	0.02	0.02	0.02	0.02
20.750	0.02	0.02	0.02	0.02
21.000	0.02	0.02	0.02	0.02
21.250	0.02	0.02	0.02	0.02
21.500	0.02	0.02	0.02	0.02
21.750	0.02	0.02	0.02	0.02
22.000	0.02	0.02	0.02	0.02
22.250	0.01	0.01	0.01	0.01
22.500	0.01	0.01	0.01	0.01
22.750	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft^3/s)
1.42
9.89
18.46
19.96
15.80
12.48
9.92
7.93
6.40
5.20
4.26
3.52
2.93
2.46
2.08
1.77
1.52
1.31
1.14
0.99
0.87
0.77
0.68
0.60
0.54
0.48
0.43
0.39
0.35
0.32
0.29
0.27
0.24
0.22
0.21
0.19
0.17
0.16
0.15
0.14
0.13
0.12
0.11

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft³/s)
0.11
0.10
0.09
0.09
0.08
0.08
0.07
0.07
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.01
0.01
0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.01
0.01
0.01
0.01
(N/A)

Subsection: Pond Routed Hydrograph (total out)

Label: POND 1 (OUT)

Return Event: 100 years

Storm Event: MoDOT Curves for O'Fallon - 100 Year

Peak Discharge	27.71 ft³/s
Time to Peak	0.950 hours
Hydrograph Volume	4.030 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.04	0.27	0.86
0.250	3.56	5.72	8.15	10.60
0.500	15.34	17.60	19.77	21.83
0.750	25.26	26.47	27.26	27.66
1.000	27.42	26.78	25.92	24.99
1.250	23.02	21.96	20.93	19.95
1.500	18.12	17.28	16.47	15.70
1.750	14.28	13.62	13.00	12.40
2.000	11.31	10.80	10.32	9.86
2.250	9.01	8.62	8.24	7.89
2.500	7.23	6.93	6.64	6.36
2.750	5.85	5.61	5.39	5.17
3.000	4.77	4.59	4.41	4.24
3.250	3.93	3.78	3.64	3.50
3.500	3.25	3.14	3.03	2.92
3.750	2.72	2.63	2.54	2.45
4.000	2.29	2.21	2.14	2.07
4.250	1.94	1.88	1.82	1.76
4.500	1.66	1.61	1.56	1.51
4.750	1.42	1.38	1.34	1.31
5.000	1.23	1.20	1.16	1.13
5.250	1.07	1.04	1.01	0.99
5.500	0.93	0.91	0.89	0.87
5.750	0.82	0.80	0.78	0.76
6.000	0.73	0.71	0.69	0.67
6.250	0.64	0.63	0.61	0.60
6.500	0.57	0.56	0.55	0.53
6.750	0.51	0.50	0.49	0.48
7.000	0.46	0.45	0.44	0.43
7.250	0.41	0.41	0.40	0.39
7.500	0.37	0.37	0.36	0.35
7.750	0.34	0.33	0.32	0.32
8.000	0.31	0.30	0.30	0.29
8.250	0.28	0.28	0.27	0.27
8.500	0.26	0.25	0.25	0.24
8.750	0.24	0.23	0.23	0.22
9.000	0.22	0.21	0.21	0.20
9.250	0.20	0.19	0.19	0.19
9.500	0.18	0.18	0.18	0.17
9.750	0.17	0.17	0.16	0.16
10.000	0.16	0.15	0.15	0.15
10.250	0.15	0.14	0.14	0.14
10.500	0.14	0.13	0.13	0.13
10.750	0.13	0.13	0.12	0.12

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
11.000	0.12	0.12	0.12	0.11
11.250	0.11	0.11	0.11	0.11
11.500	0.10	0.10	0.10	0.10
11.750	0.10	0.10	0.09	0.09
12.000	0.09	0.09	0.09	0.09
12.250	0.08	0.08	0.08	0.08
12.500	0.08	0.08	0.08	0.08
12.750	0.07	0.07	0.07	0.07
13.000	0.07	0.07	0.07	0.07
13.250	0.06	0.06	0.06	0.06
13.500	0.06	0.06	0.06	0.06
13.750	0.06	0.06	0.06	0.06
14.000	0.06	0.06	0.06	0.06
14.250	0.05	0.05	0.05	0.05
14.500	0.05	0.05	0.05	0.05
14.750	0.05	0.05	0.05	0.05
15.000	0.05	0.05	0.05	0.05
15.250	0.05	0.05	0.05	0.05
15.500	0.04	0.04	0.04	0.04
15.750	0.04	0.04	0.04	0.04
16.000	0.04	0.04	0.04	0.04
16.250	0.04	0.04	0.04	0.04
16.500	0.04	0.04	0.04	0.04
16.750	0.04	0.04	0.04	0.04
17.000	0.04	0.04	0.04	0.03
17.250	0.03	0.03	0.03	0.03
17.500	0.03	0.03	0.03	0.03
17.750	0.03	0.03	0.03	0.03
18.000	0.03	0.03	0.03	0.03
18.250	0.03	0.03	0.03	0.03
18.500	0.03	0.03	0.03	0.03
18.750	0.03	0.03	0.03	0.03
19.000	0.03	0.03	0.03	0.03
19.250	0.03	0.03	0.02	0.02
19.500	0.02	0.02	0.02	0.02
19.750	0.02	0.02	0.02	0.02
20.000	0.02	0.02	0.02	0.02
20.250	0.02	0.02	0.02	0.02
20.500	0.02	0.02	0.02	0.02
20.750	0.02	0.02	0.02	0.02
21.000	0.02	0.02	0.02	0.02
21.250	0.02	0.02	0.02	0.02
21.500	0.02	0.02	0.02	0.02
21.750	0.02	0.02	0.02	0.02
22.000	0.02	0.02	0.02	0.02
22.250	0.02	0.02	0.02	0.02
22.500	0.02	0.02	0.02	0.02
22.750	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft³/s)
1.94
13.00
23.71
27.71
24.02
19.01
14.97
11.84
9.42
7.55
6.10
4.97
4.08
3.38
2.82
2.37
2.01
1.71
1.47
1.27
1.10
0.96
0.84
0.74
0.66
0.59
0.52
0.47
0.42
0.38
0.34
0.31
0.29
0.26
0.24
0.22
0.20
0.18
0.17
0.16
0.15
0.14
0.13

Subsection: Pond Routed Hydrograph (total out)

Return Event: 100 years

Label: POND 1 (OUT)

Storm Event: MoDOT Curves for O'Fallon - 100 Year

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.12
0.11
0.11
0.10
0.09
0.09
0.08
0.07
0.07
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.01
0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.01
0.01
0.01
0.01
(N/A)

Summary for Hydrograph Addition at 'POND 1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	AREA 1

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	AREA 1	1.373	0.300	28.50
Flow (In)	POND 1	1.373	0.300	28.50

Summary for Hydrograph Addition at 'POND 1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	AREA 1

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	AREA 1	2.439	0.300	45.40
Flow (In)	POND 1	2.439	0.300	45.40

Summary for Hydrograph Addition at 'POND 1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	AREA 1

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	AREA 1	2.884	0.300	51.10
Flow (In)	POND 1	2.884	0.300	51.10

Summary for Hydrograph Addition at 'POND 1'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	AREA 1

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	AREA 1	4.037	0.300	63.78
Flow (In)	POND 1	4.037	0.300	63.78

Subsection: C and Area (Pre-Development)

Label: AREA 1

Return Event: 2 years

Storm Event: MoDOT Curves for O'Fallon - 2 Year

C and Area Results (Pre-Development)

Soil/Surface Description	C Coefficient	Area (acres)
	0.400	8.010
Weighted C & Total Area --->	0.400	8.010

Area (Adjusted) (acres)
(N/A)
3.204

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)
Postdeveloped CA	0.850	14.780
Weighted C & Total Area --->	0.850	14.780

Area (Adjusted) (acres)
(N/A)
12.563

Subsection: Rational Pre-Development Peak Flow

Return Event: 2 years

Label: AREA 1

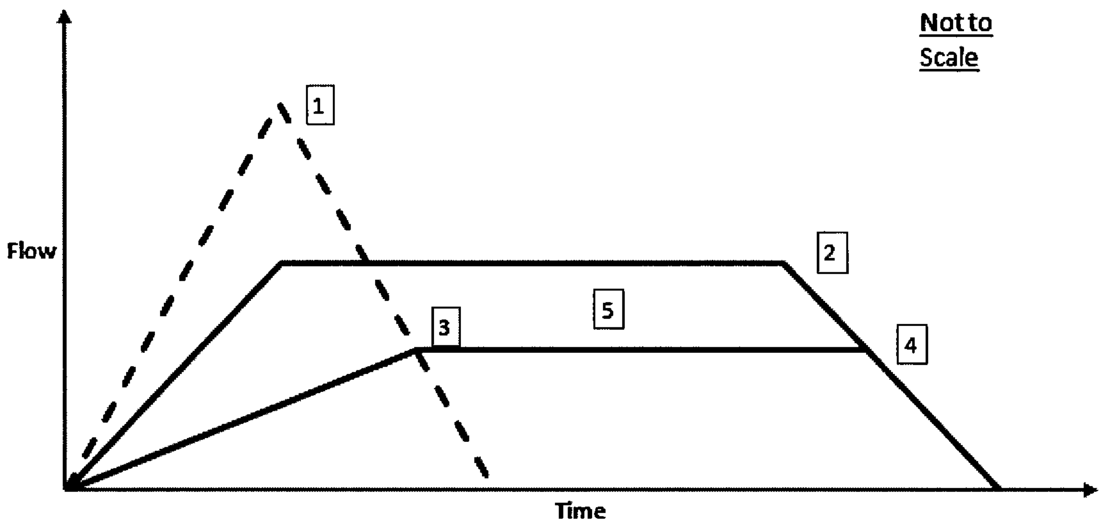
Storm Event: MoDOT Curves for O'Fallon - 2 Year

Summary of Rational Method Peak Discharges
--- Pre-Development Conditions ---

Q = CiA * Unit Conversion; Where Conversion = 43560 / (12 * 3600)

Frequency (years)	C Coefficient	C Adjustment Factor	C Coefficient (Final)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)
2	0.400	1.000	0.400	3.556	8.010	11.49

Method Type	Method T
Time of Duration (Modified Rational, Critical)	0.583 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.292	hours	Time of Duration (Modified Rational, Critical)	0.583	hours
Intensity (Modified Rational, Peak)	3.331	in/h	Intensity (Modified Rational, Critical)	2.250	in/h
Flow (Modified Rational, Peak)	42.19	ft³/s	Flow (Modified Rational, Critical)	28.50	ft³/s

[3]	
First Outflow Breakpoint (Modified Rational, Method T)	0.758 hours
Flow (Modified Rational, Allowable)	11.49 ft³/s

[4]			[5]		
Second Outflow Breakpoint (Modified Rational)	0.505	hours	Storage (Modified Rational, Estimated)	0.838	ac-ft
Flow (Modified Rational, Allowable)	11.49	ft³/s			

Modified Rational Method
--- Summary for Single Storm Frequency ---

Q = CiA * Units Conversion; Where Conversion = 43560 / (12 * 3600)

C Coefficient (Weighted)	C Coefficient (Adjusted)	Duration (hours)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)	Volume (Inflow) (ac-ft)	Volume (Storage) (ac-ft)
0.850	0.850	0.292	3.331	14.780	42.19	1.019	0.742
0.850	0.850	0.333	3.113	14.780	39.43	1.086	0.772
0.850	0.850	0.500	2.474	14.780	31.34	1.295	0.833
							Storage Maximum
0.850	0.850	0.583	2.250	14.780	28.50	1.374	0.838
0.850	0.850	0.667	2.066	14.780	26.17	1.442	0.832
0.850	0.850	0.833	1.781	14.780	22.57	1.554	0.796
0.850	0.850	1.000	1.571	14.780	19.89	1.644	0.737
0.850	0.850	2.000	0.943	14.780	11.94	1.974	0.171
0.850	0.850	3.000	0.688	14.780	8.72	(N/A)	(N/A)

C and Area Results (Pre-Development)

Soil/Surface Description	C Coefficient	Area (acres)
	0.400	8.010
Weighted C & Total Area --->	0.400	8.010

Area (Adjusted) (acres)
(N/A)
3.204

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)
Postdeveloped CA	0.850	14.780
Weighted C & Total Area --->	0.850	14.780

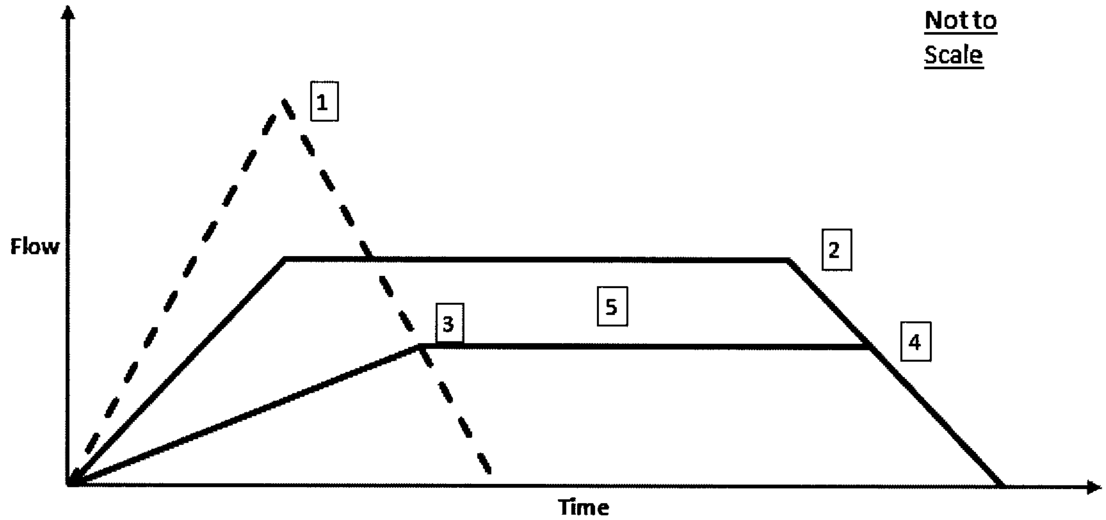
Area (Adjusted) (acres)
(N/A)
12.563

Summary of Rational Method Peak Discharges
--- Pre-Development Conditions ---

Q = CiA * Unit Conversion; Where Conversion = 43560 / (12 * 3600)

Frequency (years)	C Coefficient	C Adjustment Factor	C Coefficient (Final)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)
15	0.400	1.000	0.400	5.834	8.010	18.85

Method Type	Method T
Time of Duration (Modified Rational, Critical)	0.650 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.292	hours	Time of Duration (Modified Rational, Critical)	0.650	hours
Intensity (Modified Rational, Peak)	5.496	in/h	Intensity (Modified Rational, Critical)	3.584	in/h
Flow (Modified Rational, Peak)	69.62	ft³/s	Flow (Modified Rational, Critical)	45.40	ft³/s

[3]	
First Outflow Breakpoint (Modified Rational, Method T)	0.821 hours
Flow (Modified Rational, Allowable)	18.85 ft³/s

[4]			[5]		
Second Outflow Breakpoint (Modified Rational)	0.505	hours	Storage (Modified Rational, Estimated)	1.459	ac-ft
Flow (Modified Rational, Allowable)	18.85	ft³/s			

Modified Rational Method
--- Summary for Single Storm Frequency ---

Q = CiA * Units Conversion; Where Conversion = 43560 / (12 * 3600)

C Coefficient (Weighted)	C Coefficient (Adjusted)	Duration (hours)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)	Volume (Inflow) (ac-ft)	Volume (Storage) (ac-ft)
0.850	0.850	0.292	5.496	14.780	69.62	1.682	1.226
0.850	0.850	0.333	5.165	14.780	65.42	1.802	1.287
0.850	0.850	0.500	4.176	14.780	52.90	2.186	1.426
							Storage Maximum
0.850	0.850	0.650	3.584	14.780	45.40	2.439	1.459
0.850	0.850	0.667	3.529	14.780	44.71	2.463	1.459
0.850	0.850	0.833	3.071	14.780	38.90	2.679	1.429
0.850	0.850	1.000	2.727	14.780	34.54	2.855	1.360
0.850	0.850	2.000	1.680	14.780	21.28	3.518	0.542
0.850	0.850	3.000	1.243	14.780	15.75	(N/A)	(N/A)

C and Area Results (Pre-Development)

Soil/Surface Description	C Coefficient	Area (acres)
	0.400	8.010
Weighted C & Total Area --->	0.400	8.010

Area (Adjusted) (acres)
(N/A)
3.204

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)
Postdeveloped CA	0.850	14.780
Weighted C & Total Area --->	0.850	14.780

Area (Adjusted) (acres)
(N/A)
12.563

Summary of Rational Method Peak Discharges
--- Pre-Development Conditions ---

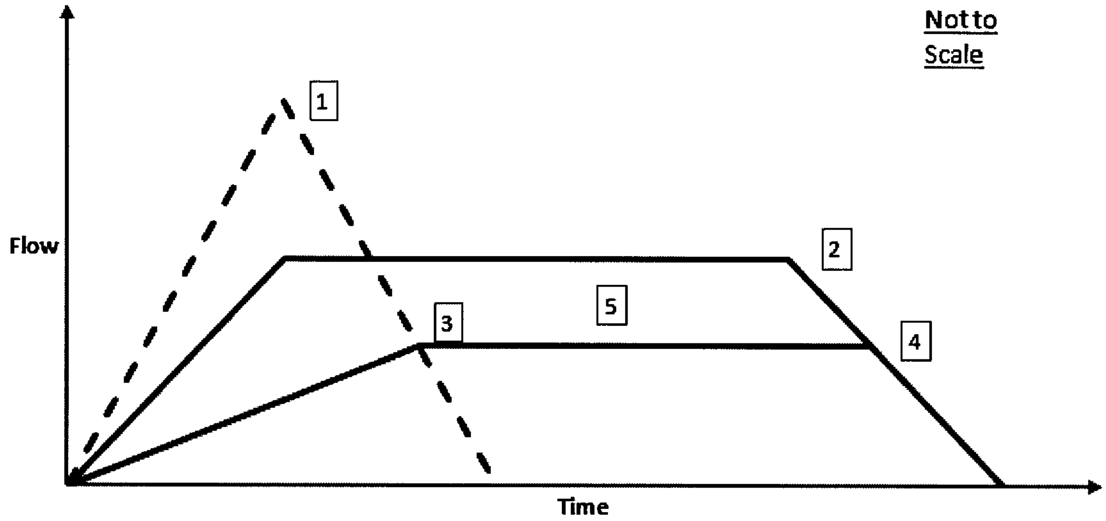
Q = CiA * Unit Conversion; Where Conversion = 43560 / (12 * 3600)

Frequency (years)	C Coefficient	C Adjustment Factor	C Coefficient (Final)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)
25	0.400	1.000	0.400	6.712	8.010	21.68

Subsection: Modified Rational Graph
Label: AREA 1

Return Event: 25 years
Storm Event: MoDOT Curves for O'Fallon - 25 Year

Method Type	Method T
Time of Duration (Modified Rational, Critical)	0.683 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.292	hours	Time of Duration (Modified Rational, Critical)	0.683	hours
Intensity (Modified Rational, Peak)	6.329	in/h	Intensity (Modified Rational, Critical)	4.034	in/h
Flow (Modified Rational, Peak)	80.17	ft³/s	Flow (Modified Rational, Critical)	51.10	ft³/s

[3]	
First Outflow Breakpoint (Modified Rational, Method T)	0.852 hours
Flow (Modified Rational, Allowable)	21.68 ft³/s

[4]			[5]		
Second Outflow Breakpoint (Modified Rational)	0.506	hours	Storage (Modified Rational, Estimated)	1.701	ac-ft
Flow (Modified Rational, Allowable)	21.68	ft³/s			

Modified Rational Method
--- Summary for Single Storm Frequency ---

Q = CiA * Units Conversion; Where Conversion = 43560 / (12 * 3600)

C Coefficient (Weighted)	C Coefficient (Adjusted)	Duration (hours)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)	Volume (Inflow) (ac-ft)	Volume (Storage) (ac-ft)
0.850	0.850	0.292	6.329	14.780	80.17	1.937	1.413
0.850	0.850	0.333	5.954	14.780	75.42	2.078	1.485
0.850	0.850	0.500	4.831	14.780	61.20	2.529	1.655
0.850	0.850	0.667	4.094	14.780	51.86	2.857	1.701
						Storage Maximum	
0.850	0.850	0.683	4.034	14.780	51.10	2.886	1.701
0.850	0.850	0.833	3.569	14.780	45.21	3.114	1.675
0.850	0.850	1.000	3.175	14.780	40.22	3.324	1.602
0.850	0.850	2.000	1.970	14.780	24.95	4.124	0.697
0.850	0.850	3.000	1.464	14.780	18.54	(N/A)	(N/A)

C and Area Results (Pre-Development)

Soil/Surface Description	C Coefficient	Area (acres)
	0.400	8.010
Weighted C & Total Area --->	0.400	8.010

Area (Adjusted) (acres)
(N/A)
3.204

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)
Postdeveloped CA	0.850	14.780
Weighted C & Total Area --->	0.850	14.780

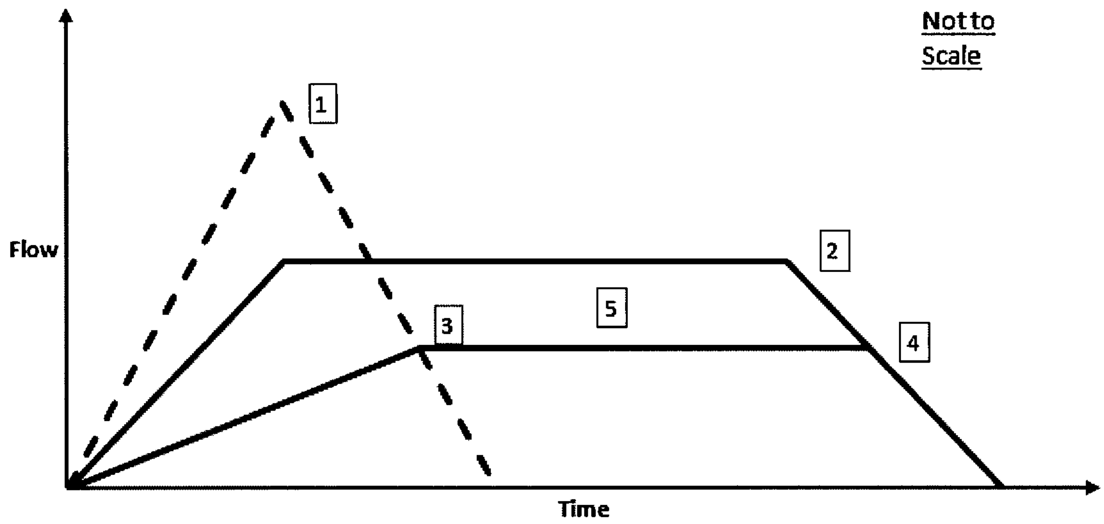
Area (Adjusted) (acres)
(N/A)
12.563

Summary of Rational Method Peak Discharges
--- Pre-Development Conditions ---

Q = CiA * Unit Conversion; Where Conversion = 43560 / (12 * 3600)

Frequency (years)	C Coefficient	C Adjustment Factor	C Coefficient (Final)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)
100	0.400	1.000	0.400	8.730	8.010	28.20

Method Type	Method T
Time of Duration (Modified Rational, Critical)	0.767 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.292	hours	Time of Duration (Modified Rational, Critical)	0.767	hours
Intensity (Modified Rational, Peak)	8.247	in/h	Intensity (Modified Rational, Critical)	5.035	in/h
Flow (Modified Rational, Peak)	104.47	ft³/s	Flow (Modified Rational, Critical)	63.78	ft³/s

[3]	
First Outflow Breakpoint (Modified Rational, Method T)	0.930 hours
Flow (Modified Rational, Allowable)	28.20 ft³/s

[4]			[5]		
Second Outflow Breakpoint (Modified Rational)	0.506	hours	Storage (Modified Rational, Estimated)	2.313	ac-ft
Flow (Modified Rational, Allowable)	28.20	ft³/s			

Modified Rational Method
--- Summary for Single Storm Frequency ---

Q = CiA * Units Conversion; Where Conversion = 43560 / (12 * 3600)

C Coefficient (Weighted)	C Coefficient (Adjusted)	Duration (hours)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)	Volume (Inflow) (ac-ft)	Volume (Storage) (ac-ft)
0.850	0.850	0.292	8.247	14.780	104.47	2.524	1.842
0.850	0.850	0.333	7.776	14.780	98.50	2.714	1.942
0.850	0.850	0.500	6.371	14.780	80.71	3.335	2.197
0.850	0.850	0.667	5.452	14.780	69.06	3.805	2.298
							Storage Maximum
0.850	0.850	0.767	5.035	14.780	63.78	4.041	2.313
0.850	0.850	0.833	4.796	14.780	60.76	4.185	2.308
0.850	0.850	1.000	4.302	14.780	54.50	4.504	2.258
0.850	0.850	2.000	2.773	14.780	35.13	5.806	1.326
0.850	0.850	3.000	2.115	14.780	26.79	(N/A)	(N/A)

Index

A

C

Project Summary

Title	Ameren COG Solar Project Basin 2
Engineer	Steven Beam, P.E.
Company	Burns & McDonnell
Date	4/11/2014

Notes

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Modified Rational Method

Q = CiA * Units Conversion; Where conversion = 43560 / (12 * 3600)

Frequency (years)	Area (acres)	Adjusted C Coefficient	Duration (hours)	Intensity (in/h)	Flow (Peak) (ft^3/s)	Flow (Allowable) (ft^3/s)
2	8.950	0.850	0.350	3.033	23.26	11.65
15	8.950	0.850	0.400	4.712	36.14	18.85
25	8.950	0.850	0.400	5.440	41.73	21.62
100	8.950	0.850	0.433	6.855	52.59	28.04

Volume (inflow) (ac-ft)	Volume (Storage) (ac-ft)
0.673	0.347
1.195	0.593
1.380	0.689
1.883	0.914

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
AREA 2	2-year	2	0.673	0.250	23.26
AREA 2	15-year	15	1.195	0.250	36.14
AREA 2	25-year	25	1.380	0.250	41.73
AREA 2	100-year	100	1.875	0.250	52.59

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)
O-2	2-year	2	0.670	0.550	4.16
O-2	15-year	15	1.191	0.550	8.74
O-2	25-year	25	1.376	0.550	10.52
O-2	100-year	100	1.871	0.600	15.35

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
POND 2 (IN)	2-year	2	0.673	0.250	23.26	(N/A)	(N/A)
POND 2 (OUT)	2-year	2	0.670	0.550	4.16	497.26	0.583
POND 2 (IN)	15-year	15	1.195	0.250	36.14	(N/A)	(N/A)
POND 2 (OUT)	15-year	15	1.191	0.550	8.74	498.06	0.990
POND 2 (IN)	25-year	25	1.380	0.250	41.73	(N/A)	(N/A)
POND 2 (OUT)	25-year	25	1.376	0.550	10.52	498.34	1.134
POND 2 (IN)	100-year	100	1.875	0.250	52.59	(N/A)	(N/A)
POND 2 (OUT)	100-year	100	1.871	0.600	15.35	499.00	1.501

Time of Concentration Results (Pre-Development)	
Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	(N/A)
Slope	0.030 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	0.71 ft/s
Segment Time of Concentration	0.118 hours
Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	678.00 ft
Is Paved?	False
Slope	0.035 ft/ft
Average Velocity	3.02 ft/s
Segment Time of Concentration	0.062 hours
Time of Concentration (Composite)	
Time of Concentration (Composite)	0.180 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	0.015
Slope	0.020 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	1.32 ft/s
Segment Time of Concentration	0.063 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	929.00 ft
Is Paved?	False
Slope	0.010 ft/ft
Average Velocity	1.61 ft/s
Segment Time of Concentration	0.160 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.223 hours

==== **SCS Channel Flow**

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== **SCS TR-55 Shallow Concentration Flow**

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Time of Concentration Results (Pre-Development)

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	(N/A)
Slope	0.030 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	0.71 ft/s
Segment Time of Concentration	0.118 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	678.00 ft
Is Paved?	False
Slope	0.035 ft/ft
Average Velocity	3.02 ft/s
Segment Time of Concentration	0.062 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.180 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	0.015
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2 Year 24 Hour Depth	3.1 in
Average Velocity	1.32 ft/s
Segment Time of Concentration	0.063 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	929.00 ft
Is Paved?	False
Slope	0.010 ft/ft
Average Velocity	1.61 ft/s
Segment Time of Concentration	0.160 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.223 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Subsection: Time of Concentration Calculations (Pre-Development)

Label: AREA 2

Return Event: 25 years

Storm Event: MoDOT Curves for O'Fallon - 25 Year

Time of Concentration Results (Pre-Development)

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	(N/A)
Slope	0.030 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	0.71 ft/s
Segment Time of Concentration	0.118 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	678.00 ft
Is Paved?	False
Slope	0.035 ft/ft
Average Velocity	3.02 ft/s
Segment Time of Concentration	0.062 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.180 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	0.015
Slope	0.020 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	1.32 ft/s
Segment Time of Concentration	0.063 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	929.00 ft
Is Paved?	False
Slope	0.010 ft/ft
Average Velocity	1.61 ft/s
Segment Time of Concentration	0.160 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.223 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Subsection: Time of Concentration Calculations (Pre-Development)

Label: AREA 2

Return Event: 100 years

Storm Event: MoDOT Curves for O'Fallon - 100 Year

Time of Concentration Results (Pre-Development)

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	(N/A)
Slope	0.030 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	0.71 ft/s
Segment Time of Concentration	0.118 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	678.00 ft
Is Paved?	False
Slope	0.035 ft/ft
Average Velocity	3.02 ft/s
Segment Time of Concentration	0.062 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.180 hours

==== **SCS Channel Flow**

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== **SCS TR-55 Shallow Concentration Flow**

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Time of Concentration Results

Segment #1: TR-55 Sheet Flow	
Hydraulic Length	300.00 ft
Manning's n	0.015
Slope	0.020 ft/ft
2 Year 24 Hour Depth	3.1 in
Average Velocity	1.32 ft/s
Segment Time of Concentration	0.063 hours

Segment #2: TR-55 Shallow Concentrated Flow	
Hydraulic Length	929.00 ft
Is Paved?	False
Slope	0.010 ft/ft
Average Velocity	1.61 ft/s
Segment Time of Concentration	0.160 hours

Time of Concentration (Composite)	
Time of Concentration (Composite)	0.223 hours

==== SCS Channel Flow

Tc =	R = Qa / Wp V = (1.49 * (R**(2/3)) * (Sf**-0.5)) / n (Lf / V) / 3600
Where:	R= Hydraulic radius Aq= Flow area, square feet Wp= Wetted perimeter, feet V= Velocity, ft/sec Sf= Slope, ft/ft n= Manning's n Tc= Time of concentration, hours Lf= Flow length, feet

==== SCS TR-55 Shallow Concentration Flow

Tc =	Unpaved surface: V = 16.1345 * (Sf**0.5) Paved Surface: V = 20.3282 * (Sf**0.5) (Lf / V) / 3600
Where:	V= Velocity, ft/sec Sf= Slope, ft/ft Tc= Time of concentration, hours Lf= Flow length, feet

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	496.00	496.02	496.10	496.22
0.250	496.57	496.76	496.95	497.10
0.500	497.25	497.26	497.23	497.20
0.750	497.14	497.11	497.08	497.05
1.000	497.00	496.97	496.95	496.93
1.250	496.88	496.86	496.84	496.82
1.500	496.78	496.77	496.75	496.73
1.750	496.70	496.69	496.67	496.66
2.000	496.63	496.62	496.60	496.59
2.250	496.57	496.56	496.55	496.54
2.500	496.52	496.51	496.50	496.49
2.750	496.47	496.46	496.45	496.45
3.000	496.43	496.42	496.41	496.41
3.250	496.39	496.39	496.38	496.37
3.500	496.36	496.36	496.35	496.35
3.750	496.33	496.33	496.32	496.32
4.000	496.31	496.31	496.30	496.30
4.250	496.29	496.28	496.28	496.28
4.500	496.27	496.26	496.26	496.26
4.750	496.25	496.25	496.24	496.24
5.000	496.23	496.23	496.23	496.22
5.250	496.22	496.22	496.21	496.21
5.500	496.21	496.20	496.20	496.20
5.750	496.19	496.19	496.19	496.19
6.000	496.18	496.18	496.18	496.18
6.250	496.17	496.17	496.17	496.17
6.500	496.16	496.16	496.16	496.16
6.750	496.15	496.15	496.15	496.15
7.000	496.14	496.14	496.14	496.14
7.250	496.14	496.14	496.13	496.13
7.500	496.13	496.13	496.13	496.13
7.750	496.12	496.12	496.12	496.12
8.000	496.12	496.12	496.12	496.11
8.250	496.11	496.11	496.11	496.11
8.500	496.11	496.11	496.11	496.10
8.750	496.10	496.10	496.10	496.10
9.000	496.10	496.10	496.10	496.10
9.250	496.09	496.09	496.09	496.09
9.500	496.09	496.09	496.09	496.09
9.750	496.09	496.09	496.08	496.08
10.000	496.08	496.08	496.08	496.08
10.250	496.08	496.08	496.08	496.08
10.500	496.08	496.07	496.07	496.07
10.750	496.07	496.07	496.07	496.07
11.000	496.07	496.07	496.07	496.07
11.250	496.07	496.07	496.07	496.06
11.500	496.06	496.06	496.06	496.06
11.750	496.06	496.06	496.06	496.06

Subsection: Time vs. Elevation

Label: POND 2 (OUT)

Return Event: 2 years

Storm Event: MoDOT Curves for O'Fallon - 2 Year

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
12.000	496.06	496.06	496.06	496.06
12.250	496.06	496.06	496.05	496.05
12.500	496.05	496.05	496.05	496.05
12.750	496.05	496.05	496.05	496.05
13.000	496.05	496.05	496.05	496.05
13.250	496.05	496.05	496.05	496.05
13.500	496.04	496.04	496.04	496.04
13.750	496.04	496.04	496.04	496.04
14.000	496.04	496.04	496.04	496.04
14.250	496.04	496.04	496.04	496.04
14.500	496.04	496.04	496.04	496.04
14.750	496.04	496.04	496.04	496.03
15.000	496.03	496.03	496.03	496.03
15.250	496.03	496.03	496.03	496.03
15.500	496.03	496.03	496.03	496.03
15.750	496.03	496.03	496.03	496.03
16.000	496.03	496.03	496.03	496.03
16.250	496.03	496.03	496.03	496.03
16.500	496.03	496.03	496.03	496.03
16.750	496.03	496.03	496.02	496.02
17.000	496.02	496.02	496.02	496.02
17.250	496.02	496.02	496.02	496.02
17.500	496.02	496.02	496.02	496.02
17.750	496.02	496.02	496.02	496.02
18.000	496.02	496.02	496.02	496.02
18.250	496.02	496.02	496.02	496.02
18.500	496.02	496.02	496.02	496.02
18.750	496.02	496.02	496.02	496.02
19.000	496.02	496.02	496.02	496.02
19.250	496.02	496.02	496.02	496.02
19.500	496.02	496.02	496.02	496.02
19.750	496.01	496.01	496.01	496.01
20.000	496.01	496.01	496.01	496.01
20.250	496.01	496.01	496.01	496.01
20.500	496.01	496.01	496.01	496.01
20.750	496.01	496.01	496.01	496.01
21.000	496.01	496.01	496.01	496.01
21.250	496.01	496.01	496.01	496.01
21.500	496.01	496.01	496.01	496.01
21.750	496.01	496.01	496.01	496.01
22.000	496.01	496.01	496.01	496.01
22.250	496.01	496.01	496.01	496.01
22.500	496.01	496.01	496.01	496.01
22.750	496.01	496.01	496.01	496.01
23.000	496.01	496.01	496.01	496.01
23.250	496.01	496.01	496.01	496.01
23.500	496.01	496.01	496.01	496.01
23.750	496.01	496.01	496.01	496.01

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
24.000	496.01	(N/A)	(N/A)	(N/A)

Elevation (ft)
496.38
497.20
497.17
497.02
496.90
496.80
496.72
496.64
496.58
496.53
496.48
496.44
496.40
496.37
496.34
496.31
496.29
496.27
496.25
496.24
496.22
496.21
496.20
496.18
496.17
496.16
496.15
496.15
496.14
496.13
496.13
496.12
496.11
496.11
496.10
496.10
496.09
496.09
496.09
496.08
496.08
496.08
496.07
496.07
496.07

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
496.06
496.06
496.06
496.06
496.05
496.05
496.05
496.05
496.05
496.04
496.04
496.04
496.04
496.04
496.03
496.03
496.03
496.03
496.03
496.03
496.03
496.03
496.02
496.02
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496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
496.01
496.01
496.01
(N/A)

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	496.00	496.04	496.15	496.33
0.250	496.87	497.16	497.42	497.67
0.500	498.01	498.06	498.06	498.00
0.750	497.88	497.82	497.76	497.71
1.000	497.60	497.56	497.51	497.46
1.250	497.38	497.34	497.30	497.27
1.500	497.20	497.17	497.14	497.11
1.750	497.05	497.02	497.00	496.97
2.000	496.93	496.90	496.88	496.86
2.250	496.82	496.80	496.78	496.77
2.500	496.73	496.72	496.70	496.69
2.750	496.66	496.64	496.63	496.62
3.000	496.59	496.58	496.57	496.56
3.250	496.54	496.53	496.52	496.51
3.500	496.49	496.48	496.47	496.46
3.750	496.44	496.44	496.43	496.42
4.000	496.41	496.40	496.39	496.39
4.250	496.37	496.37	496.36	496.36
4.500	496.35	496.34	496.33	496.33
4.750	496.32	496.31	496.31	496.31
5.000	496.30	496.29	496.29	496.28
5.250	496.28	496.27	496.27	496.26
5.500	496.26	496.25	496.25	496.25
5.750	496.24	496.24	496.23	496.23
6.000	496.22	496.22	496.22	496.22
6.250	496.21	496.21	496.21	496.20
6.500	496.20	496.20	496.19	496.19
6.750	496.19	496.18	496.18	496.18
7.000	496.18	496.17	496.17	496.17
7.250	496.17	496.16	496.16	496.16
7.500	496.16	496.15	496.15	496.15
7.750	496.15	496.15	496.14	496.14
8.000	496.14	496.14	496.14	496.14
8.250	496.13	496.13	496.13	496.13
8.500	496.13	496.12	496.12	496.12
8.750	496.12	496.12	496.12	496.12
9.000	496.11	496.11	496.11	496.11
9.250	496.11	496.11	496.11	496.11
9.500	496.10	496.10	496.10	496.10
9.750	496.10	496.10	496.10	496.10
10.000	496.10	496.09	496.09	496.09
10.250	496.09	496.09	496.09	496.09
10.500	496.09	496.09	496.09	496.09
10.750	496.08	496.08	496.08	496.08
11.000	496.08	496.08	496.08	496.08
11.250	496.08	496.08	496.08	496.07
11.500	496.07	496.07	496.07	496.07
11.750	496.07	496.07	496.07	496.07

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
12.000	496.07	496.07	496.07	496.07
12.250	496.06	496.06	496.06	496.06
12.500	496.06	496.06	496.06	496.06
12.750	496.06	496.06	496.06	496.06
13.000	496.06	496.06	496.06	496.06
13.250	496.05	496.05	496.05	496.05
13.500	496.05	496.05	496.05	496.05
13.750	496.05	496.05	496.05	496.05
14.000	496.05	496.05	496.05	496.05
14.250	496.05	496.05	496.04	496.04
14.500	496.04	496.04	496.04	496.04
14.750	496.04	496.04	496.04	496.04
15.000	496.04	496.04	496.04	496.04
15.250	496.04	496.04	496.04	496.04
15.500	496.04	496.04	496.04	496.04
15.750	496.03	496.03	496.03	496.03
16.000	496.03	496.03	496.03	496.03
16.250	496.03	496.03	496.03	496.03
16.500	496.03	496.03	496.03	496.03
16.750	496.03	496.03	496.03	496.03
17.000	496.03	496.03	496.03	496.03
17.250	496.03	496.03	496.03	496.03
17.500	496.03	496.03	496.03	496.03
17.750	496.02	496.02	496.02	496.02
18.000	496.02	496.02	496.02	496.02
18.250	496.02	496.02	496.02	496.02
18.500	496.02	496.02	496.02	496.02
18.750	496.02	496.02	496.02	496.02
19.000	496.02	496.02	496.02	496.02
19.250	496.02	496.02	496.02	496.02
19.500	496.02	496.02	496.02	496.02
19.750	496.02	496.02	496.02	496.02
20.000	496.02	496.02	496.02	496.02
20.250	496.02	496.02	496.02	496.02
20.500	496.02	496.02	496.01	496.01
20.750	496.01	496.01	496.01	496.01
21.000	496.01	496.01	496.01	496.01
21.250	496.01	496.01	496.01	496.01
21.500	496.01	496.01	496.01	496.01
21.750	496.01	496.01	496.01	496.01
22.000	496.01	496.01	496.01	496.01
22.250	496.01	496.01	496.01	496.01
22.500	496.01	496.01	496.01	496.01
22.750	496.01	496.01	496.01	496.01
23.000	496.01	496.01	496.01	496.01
23.250	496.01	496.01	496.01	496.01
23.500	496.01	496.01	496.01	496.01
23.750	496.01	496.01	496.01	496.01

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
24.000	496.01	(N/A)	(N/A)	(N/A)

Elevation (ft)
496.58
497.88
497.94
497.65
497.42
497.23
497.08
496.95
496.84
496.75
496.67
496.60
496.55
496.50
496.45
496.41
496.38
496.35
496.32
496.30
496.28
496.26
496.24
496.23
496.21
496.20
496.19
496.18
496.17
496.16
496.15
496.14
496.13
496.13
496.12
496.12
496.11
496.11
496.10
496.10
496.09
496.09
496.08
496.08
496.08

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
496.07
496.07
496.07
496.07
496.06
496.06
496.06
496.05
496.05
496.05
496.05
496.05
496.04
496.04
496.04
496.04
496.04
496.04
496.03
496.03
496.03
496.03
496.03
496.03
496.03
496.02
496.02
496.02
496.02
496.02
496.02
496.02
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496.02
496.02
496.02
496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
496.01
496.01
496.01
(N/A)

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	496.00	496.04	496.17	496.38
0.250	497.00	497.32	497.62	497.90
0.500	498.27	498.34	498.32	498.26
0.750	498.11	498.04	497.98	497.91
1.000	497.79	497.74	497.68	497.63
1.250	497.54	497.49	497.45	497.40
1.500	497.33	497.29	497.25	497.22
1.750	497.15	497.12	497.09	497.07
2.000	497.01	496.99	496.96	496.94
2.250	496.89	496.87	496.85	496.83
2.500	496.79	496.78	496.76	496.74
2.750	496.71	496.69	496.68	496.66
3.000	496.64	496.62	496.61	496.60
3.250	496.57	496.56	496.55	496.54
3.500	496.52	496.51	496.50	496.49
3.750	496.47	496.47	496.46	496.45
4.000	496.43	496.43	496.42	496.41
4.250	496.40	496.39	496.38	496.38
4.500	496.37	496.36	496.35	496.35
4.750	496.34	496.33	496.33	496.32
5.000	496.31	496.31	496.30	496.30
5.250	496.29	496.29	496.28	496.28
5.500	496.27	496.27	496.26	496.26
5.750	496.25	496.25	496.24	496.24
6.000	496.24	496.23	496.23	496.23
6.250	496.22	496.22	496.21	496.21
6.500	496.21	496.20	496.20	496.20
6.750	496.19	496.19	496.19	496.19
7.000	496.18	496.18	496.18	496.18
7.250	496.17	496.17	496.17	496.17
7.500	496.16	496.16	496.16	496.16
7.750	496.15	496.15	496.15	496.15
8.000	496.15	496.14	496.14	496.14
8.250	496.14	496.14	496.14	496.13
8.500	496.13	496.13	496.13	496.13
8.750	496.12	496.12	496.12	496.12
9.000	496.12	496.12	496.12	496.12
9.250	496.11	496.11	496.11	496.11
9.500	496.11	496.11	496.11	496.10
9.750	496.10	496.10	496.10	496.10
10.000	496.10	496.10	496.10	496.10
10.250	496.09	496.09	496.09	496.09
10.500	496.09	496.09	496.09	496.09
10.750	496.09	496.09	496.08	496.08
11.000	496.08	496.08	496.08	496.08
11.250	496.08	496.08	496.08	496.08
11.500	496.08	496.08	496.07	496.07
11.750	496.07	496.07	496.07	496.07

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
12.000	496.07	496.07	496.07	496.07
12.250	496.07	496.07	496.07	496.06
12.500	496.06	496.06	496.06	496.06
12.750	496.06	496.06	496.06	496.06
13.000	496.06	496.06	496.06	496.06
13.250	496.06	496.06	496.05	496.05
13.500	496.05	496.05	496.05	496.05
13.750	496.05	496.05	496.05	496.05
14.000	496.05	496.05	496.05	496.05
14.250	496.05	496.05	496.05	496.05
14.500	496.04	496.04	496.04	496.04
14.750	496.04	496.04	496.04	496.04
15.000	496.04	496.04	496.04	496.04
15.250	496.04	496.04	496.04	496.04
15.500	496.04	496.04	496.04	496.04
15.750	496.04	496.04	496.04	496.04
16.000	496.03	496.03	496.03	496.03
16.250	496.03	496.03	496.03	496.03
16.500	496.03	496.03	496.03	496.03
16.750	496.03	496.03	496.03	496.03
17.000	496.03	496.03	496.03	496.03
17.250	496.03	496.03	496.03	496.03
17.500	496.03	496.03	496.03	496.03
17.750	496.03	496.03	496.02	496.02
18.000	496.02	496.02	496.02	496.02
18.250	496.02	496.02	496.02	496.02
18.500	496.02	496.02	496.02	496.02
18.750	496.02	496.02	496.02	496.02
19.000	496.02	496.02	496.02	496.02
19.250	496.02	496.02	496.02	496.02
19.500	496.02	496.02	496.02	496.02
19.750	496.02	496.02	496.02	496.02
20.000	496.02	496.02	496.02	496.02
20.250	496.02	496.02	496.02	496.02
20.500	496.02	496.02	496.02	496.02
20.750	496.02	496.01	496.01	496.01
21.000	496.01	496.01	496.01	496.01
21.250	496.01	496.01	496.01	496.01
21.500	496.01	496.01	496.01	496.01
21.750	496.01	496.01	496.01	496.01
22.000	496.01	496.01	496.01	496.01
22.250	496.01	496.01	496.01	496.01
22.500	496.01	496.01	496.01	496.01
22.750	496.01	496.01	496.01	496.01
23.000	496.01	496.01	496.01	496.01
23.250	496.01	496.01	496.01	496.01
23.500	496.01	496.01	496.01	496.01
23.750	496.01	496.01	496.01	496.01

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
24.000	496.01	(N/A)	(N/A)	(N/A)

Elevation (ft)
496.67
498.13
498.19
497.85
497.58
497.36
497.19
497.04
496.92
496.81
496.73
496.65
496.59
496.53
496.48
496.44
496.40
496.37
496.34
496.32
496.29
496.27
496.26
496.24
496.22
496.21
496.20
496.19
496.17
496.16
496.16
496.15
496.14
496.13
496.13
496.12
496.11
496.11
496.10
496.10
496.10
496.09
496.09
496.08
496.08

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
496.08
496.07
496.07
496.07
496.06
496.06
496.06
496.06
496.05
496.05
496.05
496.05
496.05
496.04
496.04
496.04
496.04
496.04
496.03
496.03
496.03
496.03
496.03
496.03
496.03
496.03
496.02
496.02
496.02
496.02
496.02
496.02
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496.02
496.02
496.02
496.02
496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
496.01
496.01
496.01
(N/A)

Subsection: Time vs. Elevation

Label: POND 2 (OUT)

Return Event: 100 years

Storm Event: MoDOT Curves for O'Fallon - 100 Year

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	496.00	496.06	496.22	496.48
0.250	497.24	497.63	498.00	498.34
0.500	498.85	498.97	499.00	498.95
0.750	498.74	498.64	498.55	498.46
1.000	498.30	498.22	498.14	498.07
1.250	497.94	497.88	497.82	497.76
1.500	497.65	497.60	497.56	497.51
1.750	497.42	497.38	497.34	497.31
2.000	497.23	497.20	497.17	497.14
2.250	497.08	497.05	497.02	497.00
2.500	496.95	496.93	496.90	496.88
2.750	496.84	496.82	496.80	496.78
3.000	496.75	496.73	496.72	496.70
3.250	496.67	496.66	496.64	496.63
3.500	496.60	496.59	496.58	496.57
3.750	496.55	496.54	496.53	496.52
4.000	496.50	496.49	496.48	496.47
4.250	496.45	496.44	496.44	496.43
4.500	496.41	496.41	496.40	496.39
4.750	496.38	496.37	496.37	496.36
5.000	496.35	496.35	496.34	496.33
5.250	496.32	496.32	496.31	496.31
5.500	496.30	496.30	496.29	496.29
5.750	496.28	496.28	496.27	496.27
6.000	496.26	496.26	496.25	496.25
6.250	496.24	496.24	496.24	496.23
6.500	496.23	496.22	496.22	496.22
6.750	496.21	496.21	496.21	496.21
7.000	496.20	496.20	496.20	496.19
7.250	496.19	496.19	496.18	496.18
7.500	496.18	496.18	496.17	496.17
7.750	496.17	496.17	496.16	496.16
8.000	496.16	496.16	496.15	496.15
8.250	496.15	496.15	496.15	496.14
8.500	496.14	496.14	496.14	496.14
8.750	496.13	496.13	496.13	496.13
9.000	496.13	496.13	496.12	496.12
9.250	496.12	496.12	496.12	496.12
9.500	496.12	496.11	496.11	496.11
9.750	496.11	496.11	496.11	496.11
10.000	496.11	496.10	496.10	496.10
10.250	496.10	496.10	496.10	496.10
10.500	496.10	496.10	496.09	496.09
10.750	496.09	496.09	496.09	496.09
11.000	496.09	496.09	496.09	496.09
11.250	496.08	496.08	496.08	496.08
11.500	496.08	496.08	496.08	496.08
11.750	496.08	496.08	496.08	496.08

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
12.000	496.07	496.07	496.07	496.07
12.250	496.07	496.07	496.07	496.07
12.500	496.07	496.07	496.07	496.07
12.750	496.07	496.06	496.06	496.06
13.000	496.06	496.06	496.06	496.06
13.250	496.06	496.06	496.06	496.06
13.500	496.06	496.06	496.06	496.06
13.750	496.05	496.05	496.05	496.05
14.000	496.05	496.05	496.05	496.05
14.250	496.05	496.05	496.05	496.05
14.500	496.05	496.05	496.05	496.05
14.750	496.05	496.05	496.05	496.04
15.000	496.04	496.04	496.04	496.04
15.250	496.04	496.04	496.04	496.04
15.500	496.04	496.04	496.04	496.04
15.750	496.04	496.04	496.04	496.04
16.000	496.04	496.04	496.04	496.04
16.250	496.04	496.03	496.03	496.03
16.500	496.03	496.03	496.03	496.03
16.750	496.03	496.03	496.03	496.03
17.000	496.03	496.03	496.03	496.03
17.250	496.03	496.03	496.03	496.03
17.500	496.03	496.03	496.03	496.03
17.750	496.03	496.03	496.03	496.03
18.000	496.03	496.03	496.03	496.03
18.250	496.02	496.02	496.02	496.02
18.500	496.02	496.02	496.02	496.02
18.750	496.02	496.02	496.02	496.02
19.000	496.02	496.02	496.02	496.02
19.250	496.02	496.02	496.02	496.02
19.500	496.02	496.02	496.02	496.02
19.750	496.02	496.02	496.02	496.02
20.000	496.02	496.02	496.02	496.02
20.250	496.02	496.02	496.02	496.02
20.500	496.02	496.02	496.02	496.02
20.750	496.02	496.02	496.02	496.02
21.000	496.02	496.02	496.02	496.01
21.250	496.01	496.01	496.01	496.01
21.500	496.01	496.01	496.01	496.01
21.750	496.01	496.01	496.01	496.01
22.000	496.01	496.01	496.01	496.01
22.250	496.01	496.01	496.01	496.01
22.500	496.01	496.01	496.01	496.01
22.750	496.01	496.01	496.01	496.01
23.000	496.01	496.01	496.01	496.01
23.250	496.01	496.01	496.01	496.01
23.500	496.01	496.01	496.01	496.01
23.750	496.01	496.01	496.01	496.01

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
24.000	496.01	(N/A)	(N/A)	(N/A)

Elevation (ft)
496.83
498.63
498.85
498.38
498.00
497.71
497.47
497.27
497.11
496.97
496.86
496.77
496.69
496.62
496.56
496.51
496.46
496.42
496.39
496.36
496.33
496.31
496.28
496.26
496.25
496.23
496.22
496.20
496.19
496.18
496.17
496.16
496.15
496.14
496.14
496.13
496.12
496.12
496.11
496.11
496.10
496.10
496.09
496.09
496.09

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
496.08
496.08
496.07
496.07
496.07
496.07
496.06
496.06
496.06
496.06
496.05
496.05
496.05
496.05
496.04
496.04
496.04
496.04
496.04
496.04
496.03
496.03
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496.03
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496.03
496.03
496.03
496.02
496.02
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496.02
496.02
496.02
496.02
496.02
496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01
496.01

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Elevation (ft)
496.01
496.01
496.01
(N/A)

Subsection: Elevation-Area Volume Curve

Return Event: 2 years

Label: POND 2

Storm Event: MoDOT Curves for O'Fallon - 2 Year

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr(A1*A2) (acres)
496.00	0.0	0.438	0.000
497.00	0.0	0.478	1.373
498.00	0.0	0.520	1.497
499.00	0.0	0.564	1.626
500.00	0.0	0.610	1.760
501.00	0.0	0.675	1.927
502.00	0.0	1.062	2.584
503.00	0.0	1.473	3.786

Volume (ac-ft)	Volume (Total) (ac-ft)
0.000	0.000
0.458	0.458
0.499	0.957
0.542	1.499
0.587	2.085
0.642	2.728
0.861	3.589
1.262	4.851

Pond Volume Equations
*** Incremental volume computed by the Conic Method for Reservoir Volumes.**

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(Area1 * Area2))

where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr(A1*A2) (acres)
496.00	0.0	0.438	0.000
497.00	0.0	0.478	1.373
498.00	0.0	0.520	1.497
499.00	0.0	0.564	1.626
500.00	0.0	0.610	1.760
501.00	0.0	0.675	1.927
502.00	0.0	1.062	2.584
503.00	0.0	1.473	3.786

Volume (ac-ft)	Volume (Total) (ac-ft)
0.000	0.000
0.458	0.458
0.499	0.957
0.542	1.499
0.587	2.085
0.642	2.728
0.861	3.589
1.262	4.851

Pond Volume Equations
*** Incremental volume computed by the Conic Method for Reservoir Volumes.**

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where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr(A1*A2) (acres)
496.00	0.0	0.438	0.000
497.00	0.0	0.478	1.373
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499.00	0.0	0.564	1.626
500.00	0.0	0.610	1.760
501.00	0.0	0.675	1.927
502.00	0.0	1.062	2.584
503.00	0.0	1.473	3.786

Volume (ac-ft)	Volume (Total) (ac-ft)
0.000	0.000
0.458	0.458
0.499	0.957
0.542	1.499
0.587	2.085
0.642	2.728
0.861	3.589
1.262	4.851

Pond Volume Equations
*** Incremental volume computed by the Conic Method for Reservoir Volumes.**

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(Area1 * Area2))

where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

Subsection: Elevation-Area Volume Curve

Label: POND 2

Return Event: 100 years

Storm Event: MoDOT Curves for O'Fallon - 100 Year

Elevation (ft)	Planimeter (ft^2)	Area (acres)	A1+A2+sqr(A1*A2) (acres)
496.00	0.0	0.438	0.000
497.00	0.0	0.478	1.373
498.00	0.0	0.520	1.497
499.00	0.0	0.564	1.626
500.00	0.0	0.610	1.760
501.00	0.0	0.675	1.927
502.00	0.0	1.062	2.584
503.00	0.0	1.473	3.786

Volume (ac-ft)	Volume (Total) (ac-ft)
0.000	0.000
0.458	0.458
0.499	0.957
0.542	1.499
0.587	2.085
0.642	2.728
0.861	3.589
1.262	4.851

Pond Volume Equations
*** Incremental volume computed by the Conic Method for Reservoir Volumes.**

Volume = (1/3) * (EL2 - El1) * (Area1 + Area2 + sqr(Area1 * Area2))

where:	EL1, EL2	Lower and upper elevations of the increment
	Area1, Area2	Areas computed for EL1, EL2, respectively
	Volume	Incremental volume between EL1 and EL2

Requested Pond Water Surface Elevations	
Minimum (Headwater)	496.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	503.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Irregular Weir	Weir - 1	Forward	TW	496.00	503.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	503.00
9.50	503.00
9.51	496.00
10.49	496.00
10.50	503.00
20.00	503.00

Lowest Elevation	496.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances

Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft^3/s
Flow Tolerance (Maximum)	10.000 ft^3/s

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
496.00	0.00	(N/A)
496.10	0.09	(N/A)
496.20	0.26	(N/A)
496.30	0.48	(N/A)
496.40	0.74	(N/A)
496.50	1.04	(N/A)
496.60	1.37	(N/A)
496.70	1.72	(N/A)
496.80	2.11	(N/A)
496.90	2.51	(N/A)
497.00	2.94	(N/A)
497.10	3.40	(N/A)
497.20	3.87	(N/A)
497.30	4.36	(N/A)
497.40	4.88	(N/A)
497.50	5.41	(N/A)
497.60	5.96	(N/A)
497.70	6.53	(N/A)
497.80	7.11	(N/A)
497.90	7.71	(N/A)
498.00	8.33	(N/A)
498.10	8.97	(N/A)
498.20	9.62	(N/A)
498.30	10.28	(N/A)
498.40	10.96	(N/A)
498.50	11.65	(N/A)
498.60	12.36	(N/A)
498.70	13.08	(N/A)
498.80	13.81	(N/A)
498.90	14.56	(N/A)
499.00	15.32	(N/A)
499.10	16.10	(N/A)
499.20	16.89	(N/A)
499.30	17.68	(N/A)
499.40	18.50	(N/A)
499.50	19.32	(N/A)
499.60	20.16	(N/A)
499.70	21.00	(N/A)
499.80	21.86	(N/A)
499.90	22.73	(N/A)
500.00	23.62	(N/A)
500.10	24.51	(N/A)
500.20	25.42	(N/A)
500.30	26.33	(N/A)
500.40	27.26	(N/A)
500.50	28.20	(N/A)
500.60	29.14	(N/A)
500.70	30.10	(N/A)
500.80	31.07	(N/A)
500.90	32.05	(N/A)

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
501.00	33.04	(N/A)
501.10	34.04	(N/A)
501.20	35.05	(N/A)
501.30	36.07	(N/A)
501.40	37.10	(N/A)
501.50	38.14	(N/A)
501.60	39.19	(N/A)
501.70	40.24	(N/A)
501.80	41.31	(N/A)
501.90	42.39	(N/A)
502.00	43.48	(N/A)
502.10	44.57	(N/A)
502.20	45.68	(N/A)
502.30	46.79	(N/A)
502.40	47.92	(N/A)
502.50	49.05	(N/A)
502.60	50.19	(N/A)
502.70	51.34	(N/A)
502.80	52.50	(N/A)
502.90	53.67	(N/A)
503.00	54.84	(N/A)

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
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0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1

Composite Outflow Summary

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
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0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1

Requested Pond Water Surface Elevations	
Minimum (Headwater)	496.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	503.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Irregular Weir	Weir - 1	Forward	TW	496.00	503.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	503.00
9.50	503.00
9.51	496.00
10.49	496.00
10.50	503.00
20.00	503.00

Lowest Elevation	496.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances

Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
496.00	0.00	(N/A)
496.10	0.09	(N/A)
496.20	0.26	(N/A)
496.30	0.48	(N/A)
496.40	0.74	(N/A)
496.50	1.04	(N/A)
496.60	1.37	(N/A)
496.70	1.72	(N/A)
496.80	2.11	(N/A)
496.90	2.51	(N/A)
497.00	2.94	(N/A)
497.10	3.40	(N/A)
497.20	3.87	(N/A)
497.30	4.36	(N/A)
497.40	4.88	(N/A)
497.50	5.41	(N/A)
497.60	5.96	(N/A)
497.70	6.53	(N/A)
497.80	7.11	(N/A)
497.90	7.71	(N/A)
498.00	8.33	(N/A)
498.10	8.97	(N/A)
498.20	9.62	(N/A)
498.30	10.28	(N/A)
498.40	10.96	(N/A)
498.50	11.65	(N/A)
498.60	12.36	(N/A)
498.70	13.08	(N/A)
498.80	13.81	(N/A)
498.90	14.56	(N/A)
499.00	15.32	(N/A)
499.10	16.10	(N/A)
499.20	16.89	(N/A)
499.30	17.68	(N/A)
499.40	18.50	(N/A)
499.50	19.32	(N/A)
499.60	20.16	(N/A)
499.70	21.00	(N/A)
499.80	21.86	(N/A)
499.90	22.73	(N/A)
500.00	23.62	(N/A)
500.10	24.51	(N/A)
500.20	25.42	(N/A)
500.30	26.33	(N/A)
500.40	27.26	(N/A)
500.50	28.20	(N/A)
500.60	29.14	(N/A)
500.70	30.10	(N/A)
500.80	31.07	(N/A)
500.90	32.05	(N/A)

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
501.00	33.04	(N/A)
501.10	34.04	(N/A)
501.20	35.05	(N/A)
501.30	36.07	(N/A)
501.40	37.10	(N/A)
501.50	38.14	(N/A)
501.60	39.19	(N/A)
501.70	40.24	(N/A)
501.80	41.31	(N/A)
501.90	42.39	(N/A)
502.00	43.48	(N/A)
502.10	44.57	(N/A)
502.20	45.68	(N/A)
502.30	46.79	(N/A)
502.40	47.92	(N/A)
502.50	49.05	(N/A)
502.60	50.19	(N/A)
502.70	51.34	(N/A)
502.80	52.50	(N/A)
502.90	53.67	(N/A)
503.00	54.84	(N/A)

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
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0.00	Weir - 1
0.00	Weir - 1
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0.00	Weir - 1

Composite Outflow Summary

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
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0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1

Requested Pond Water Surface Elevations	
Minimum (Headwater)	496.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	503.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Irregular Weir Tailwater Settings	Weir - 1 Tailwater	Forward	TW	496.00 (N/A)	503.00 (N/A)

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	503.00
9.50	503.00
9.51	496.00
10.49	496.00
10.50	503.00
20.00	503.00

Lowest Elevation	496.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances

Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
496.00	0.00	(N/A)
496.10	0.09	(N/A)
496.20	0.26	(N/A)
496.30	0.48	(N/A)
496.40	0.74	(N/A)
496.50	1.04	(N/A)
496.60	1.37	(N/A)
496.70	1.72	(N/A)
496.80	2.11	(N/A)
496.90	2.51	(N/A)
497.00	2.94	(N/A)
497.10	3.40	(N/A)
497.20	3.87	(N/A)
497.30	4.36	(N/A)
497.40	4.88	(N/A)
497.50	5.41	(N/A)
497.60	5.96	(N/A)
497.70	6.53	(N/A)
497.80	7.11	(N/A)
497.90	7.71	(N/A)
498.00	8.33	(N/A)
498.10	8.97	(N/A)
498.20	9.62	(N/A)
498.30	10.28	(N/A)
498.40	10.96	(N/A)
498.50	11.65	(N/A)
498.60	12.36	(N/A)
498.70	13.08	(N/A)
498.80	13.81	(N/A)
498.90	14.56	(N/A)
499.00	15.32	(N/A)
499.10	16.10	(N/A)
499.20	16.89	(N/A)
499.30	17.68	(N/A)
499.40	18.50	(N/A)
499.50	19.32	(N/A)
499.60	20.16	(N/A)
499.70	21.00	(N/A)
499.80	21.86	(N/A)
499.90	22.73	(N/A)
500.00	23.62	(N/A)
500.10	24.51	(N/A)
500.20	25.42	(N/A)
500.30	26.33	(N/A)
500.40	27.26	(N/A)
500.50	28.20	(N/A)
500.60	29.14	(N/A)
500.70	30.10	(N/A)
500.80	31.07	(N/A)
500.90	32.05	(N/A)

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
501.00	33.04	(N/A)
501.10	34.04	(N/A)
501.20	35.05	(N/A)
501.30	36.07	(N/A)
501.40	37.10	(N/A)
501.50	38.14	(N/A)
501.60	39.19	(N/A)
501.70	40.24	(N/A)
501.80	41.31	(N/A)
501.90	42.39	(N/A)
502.00	43.48	(N/A)
502.10	44.57	(N/A)
502.20	45.68	(N/A)
502.30	46.79	(N/A)
502.40	47.92	(N/A)
502.50	49.05	(N/A)
502.60	50.19	(N/A)
502.70	51.34	(N/A)
502.80	52.50	(N/A)
502.90	53.67	(N/A)
503.00	54.84	(N/A)

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1

Composite Outflow Summary

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
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0.00	Weir - 1
0.00	Weir - 1

Requested Pond Water Surface Elevations	
Minimum (Headwater)	496.00 ft
Increment (Headwater)	0.10 ft
Maximum (Headwater)	503.00 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Irregular Weir Tailwater Settings	Weir - 1 Tailwater	Forward	TW	496.00 (N/A)	503.00 (N/A)

Structure ID: Weir - 1
Structure Type: Irregular Weir

Station (ft)	Elevation (ft)
0.00	503.00
9.50	503.00
9.51	496.00
10.49	496.00
10.50	503.00
20.00	503.00

Lowest Elevation	496.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW
Structure Type: TW Setup, DS Channel

Tailwater Type	Free Outfall

Convergence Tolerances

Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft^3/s)	Tailwater Elevation (ft)
496.00	0.00	(N/A)
496.10	0.09	(N/A)
496.20	0.26	(N/A)
496.30	0.48	(N/A)
496.40	0.74	(N/A)
496.50	1.04	(N/A)
496.60	1.37	(N/A)
496.70	1.72	(N/A)
496.80	2.11	(N/A)
496.90	2.51	(N/A)
497.00	2.94	(N/A)
497.10	3.40	(N/A)
497.20	3.87	(N/A)
497.30	4.36	(N/A)
497.40	4.88	(N/A)
497.50	5.41	(N/A)
497.60	5.96	(N/A)
497.70	6.53	(N/A)
497.80	7.11	(N/A)
497.90	7.71	(N/A)
498.00	8.33	(N/A)
498.10	8.97	(N/A)
498.20	9.62	(N/A)
498.30	10.28	(N/A)
498.40	10.96	(N/A)
498.50	11.65	(N/A)
498.60	12.36	(N/A)
498.70	13.08	(N/A)
498.80	13.81	(N/A)
498.90	14.56	(N/A)
499.00	15.32	(N/A)
499.10	16.10	(N/A)
499.20	16.89	(N/A)
499.30	17.68	(N/A)
499.40	18.50	(N/A)
499.50	19.32	(N/A)
499.60	20.16	(N/A)
499.70	21.00	(N/A)
499.80	21.86	(N/A)
499.90	22.73	(N/A)
500.00	23.62	(N/A)
500.10	24.51	(N/A)
500.20	25.42	(N/A)
500.30	26.33	(N/A)
500.40	27.26	(N/A)
500.50	28.20	(N/A)
500.60	29.14	(N/A)
500.70	30.10	(N/A)
500.80	31.07	(N/A)
500.90	32.05	(N/A)

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft³/s)	Tailwater Elevation (ft)
501.00	33.04	(N/A)
501.10	34.04	(N/A)
501.20	35.05	(N/A)
501.30	36.07	(N/A)
501.40	37.10	(N/A)
501.50	38.14	(N/A)
501.60	39.19	(N/A)
501.70	40.24	(N/A)
501.80	41.31	(N/A)
501.90	42.39	(N/A)
502.00	43.48	(N/A)
502.10	44.57	(N/A)
502.20	45.68	(N/A)
502.30	46.79	(N/A)
502.40	47.92	(N/A)
502.50	49.05	(N/A)
502.60	50.19	(N/A)
502.70	51.34	(N/A)
502.80	52.50	(N/A)
502.90	53.67	(N/A)
503.00	54.84	(N/A)

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
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0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1

Composite Outflow Summary

Convergence Error (ft)	Contributing Structures
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
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0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1
0.00	Weir - 1

Subsection: Diverted Hydrograph
Label: Outlet-2

Return Event: 2 years
Storm Event: MoDOT Curves for O'Fallon - 2 Year

Peak Discharge	4.16 ft^3/s
Time to Peak	0.550 hours
Hydrograph Volume	0.670 ac-ft

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
0.000	0.00	0.02	0.09	0.30
0.250	1.27	1.96	2.71	3.39
0.500	4.13	4.16	4.04	3.88
0.750	3.58	3.43	3.30	3.18
1.000	2.94	2.83	2.73	2.63
1.250	2.44	2.35	2.27	2.19
1.500	2.04	1.98	1.91	1.85
1.750	1.73	1.67	1.62	1.57
2.000	1.47	1.43	1.38	1.34
2.250	1.27	1.23	1.19	1.16
2.500	1.09	1.06	1.03	1.00
2.750	0.95	0.93	0.90	0.88
3.000	0.83	0.81	0.79	0.77
3.250	0.73	0.71	0.69	0.68
3.500	0.65	0.63	0.62	0.60
3.750	0.57	0.56	0.55	0.53
4.000	0.51	0.50	0.49	0.48
4.250	0.46	0.45	0.44	0.43
4.500	0.41	0.40	0.40	0.39
4.750	0.37	0.37	0.36	0.35
5.000	0.34	0.33	0.32	0.32
5.250	0.30	0.30	0.29	0.29
5.500	0.27	0.27	0.26	0.26
5.750	0.25	0.25	0.24	0.24
6.000	0.23	0.23	0.22	0.22
6.250	0.21	0.21	0.21	0.20
6.500	0.20	0.20	0.19	0.19
6.750	0.18	0.18	0.18	0.17
7.000	0.17	0.17	0.16	0.16
7.250	0.16	0.15	0.15	0.15
7.500	0.14	0.14	0.14	0.14
7.750	0.13	0.13	0.13	0.13
8.000	0.12	0.12	0.12	0.12
8.250	0.11	0.11	0.11	0.11
8.500	0.11	0.10	0.10	0.10
8.750	0.10	0.10	0.09	0.09
9.000	0.09	0.09	0.09	0.09
9.250	0.09	0.09	0.09	0.09
9.500	0.08	0.08	0.08	0.08
9.750	0.08	0.08	0.08	0.08
10.000	0.08	0.08	0.08	0.07
10.250	0.07	0.07	0.07	0.07
10.500	0.07	0.07	0.07	0.07
10.750	0.07	0.07	0.07	0.07

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
11.000	0.06	0.06	0.06	0.06
11.250	0.06	0.06	0.06	0.06
11.500	0.06	0.06	0.06	0.06
11.750	0.06	0.06	0.06	0.05
12.000	0.05	0.05	0.05	0.05
12.250	0.05	0.05	0.05	0.05
12.500	0.05	0.05	0.05	0.05
12.750	0.05	0.05	0.05	0.05
13.000	0.05	0.04	0.04	0.04
13.250	0.04	0.04	0.04	0.04
13.500	0.04	0.04	0.04	0.04
13.750	0.04	0.04	0.04	0.04
14.000	0.04	0.04	0.04	0.04
14.250	0.04	0.04	0.04	0.04
14.500	0.03	0.03	0.03	0.03
14.750	0.03	0.03	0.03	0.03
15.000	0.03	0.03	0.03	0.03
15.250	0.03	0.03	0.03	0.03
15.500	0.03	0.03	0.03	0.03
15.750	0.03	0.03	0.03	0.03
16.000	0.03	0.03	0.03	0.03
16.250	0.03	0.03	0.03	0.03
16.500	0.02	0.02	0.02	0.02
16.750	0.02	0.02	0.02	0.02
17.000	0.02	0.02	0.02	0.02
17.250	0.02	0.02	0.02	0.02
17.500	0.02	0.02	0.02	0.02
17.750	0.02	0.02	0.02	0.02
18.000	0.02	0.02	0.02	0.02
18.250	0.02	0.02	0.02	0.02
18.500	0.02	0.02	0.02	0.02
18.750	0.02	0.02	0.02	0.02
19.000	0.02	0.02	0.02	0.02
19.250	0.02	0.02	0.01	0.01
19.500	0.01	0.01	0.01	0.01
19.750	0.01	0.01	0.01	0.01
20.000	0.01	0.01	0.01	0.01
20.250	0.01	0.01	0.01	0.01
20.500	0.01	0.01	0.01	0.01
20.750	0.01	0.01	0.01	0.01
21.000	0.01	0.01	0.01	0.01
21.250	0.01	0.01	0.01	0.01
21.500	0.01	0.01	0.01	0.01
21.750	0.01	0.01	0.01	0.01
22.000	0.01	0.01	0.01	0.01
22.250	0.01	0.01	0.01	0.01
22.500	0.01	0.01	0.01	0.01
22.750	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft³/s)
0.69
3.87
3.72
3.05
2.53
2.12
1.79
1.52
1.30
1.12
0.98
0.85
0.75
0.66
0.59
0.52
0.47
0.42
0.38
0.34
0.31
0.28
0.26
0.24
0.22
0.20
0.19
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.09
0.08
0.08
0.08
0.07
0.07
0.07

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.02
0.02
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0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.01
0.01
0.01
0.01
(N/A)

Subsection: Diverted Hydrograph

Label: Outlet-2

Return Event: 15 years

Storm Event: MoDOT Curves for O'Fallon - 15 Year

Peak Discharge	8.74 ft^3/s
Time to Peak	0.550 hours
Hydrograph Volume	1.191 ac-ft

HYDROGRAPH ORDINATES (ft^3/s)

Output Time Increment = 0.050 hours

Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
0.000	0.00	0.04	0.18	0.57
0.250	2.39	3.66	5.00	6.38
0.500	8.37	8.74	8.69	8.36
0.750	7.58	7.22	6.88	6.56
1.000	5.98	5.71	5.46	5.22
1.250	4.78	4.58	4.39	4.21
1.500	3.87	3.72	3.57	3.43
1.750	3.17	3.05	2.93	2.82
2.000	2.62	2.53	2.44	2.35
2.250	2.19	2.11	2.04	1.97
2.500	1.85	1.78	1.72	1.67
2.750	1.57	1.52	1.47	1.43
3.000	1.34	1.30	1.26	1.23
3.250	1.16	1.12	1.09	1.06
3.500	1.00	0.98	0.95	0.92
3.750	0.88	0.85	0.83	0.81
4.000	0.77	0.75	0.73	0.71
4.250	0.68	0.66	0.65	0.63
4.500	0.60	0.59	0.57	0.56
4.750	0.53	0.52	0.51	0.50
5.000	0.48	0.47	0.46	0.45
5.250	0.43	0.42	0.41	0.40
5.500	0.39	0.38	0.37	0.36
5.750	0.35	0.34	0.34	0.33
6.000	0.32	0.31	0.30	0.30
6.250	0.29	0.28	0.27	0.27
6.500	0.26	0.26	0.25	0.25
6.750	0.24	0.24	0.23	0.23
7.000	0.22	0.22	0.21	0.21
7.250	0.20	0.20	0.20	0.19
7.500	0.19	0.19	0.18	0.18
7.750	0.17	0.17	0.17	0.17
8.000	0.16	0.16	0.16	0.15
8.250	0.15	0.15	0.14	0.14
8.500	0.14	0.14	0.13	0.13
8.750	0.13	0.13	0.12	0.12
9.000	0.12	0.12	0.11	0.11
9.250	0.11	0.11	0.11	0.10
9.500	0.10	0.10	0.10	0.10
9.750	0.09	0.09	0.09	0.09
10.000	0.09	0.09	0.09	0.09
10.250	0.09	0.08	0.08	0.08
10.500	0.08	0.08	0.08	0.08
10.750	0.08	0.08	0.08	0.08

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
11.000	0.07	0.07	0.07	0.07
11.250	0.07	0.07	0.07	0.07
11.500	0.07	0.07	0.07	0.07
11.750	0.07	0.06	0.06	0.06
12.000	0.06	0.06	0.06	0.06
12.250	0.06	0.06	0.06	0.06
12.500	0.06	0.06	0.06	0.06
12.750	0.05	0.05	0.05	0.05
13.000	0.05	0.05	0.05	0.05
13.250	0.05	0.05	0.05	0.05
13.500	0.05	0.05	0.05	0.05
13.750	0.05	0.05	0.05	0.04
14.000	0.04	0.04	0.04	0.04
14.250	0.04	0.04	0.04	0.04
14.500	0.04	0.04	0.04	0.04
14.750	0.04	0.04	0.04	0.04
15.000	0.04	0.04	0.04	0.04
15.250	0.04	0.04	0.03	0.03
15.500	0.03	0.03	0.03	0.03
15.750	0.03	0.03	0.03	0.03
16.000	0.03	0.03	0.03	0.03
16.250	0.03	0.03	0.03	0.03
16.500	0.03	0.03	0.03	0.03
16.750	0.03	0.03	0.03	0.03
17.000	0.03	0.03	0.03	0.03
17.250	0.03	0.02	0.02	0.02
17.500	0.02	0.02	0.02	0.02
17.750	0.02	0.02	0.02	0.02
18.000	0.02	0.02	0.02	0.02
18.250	0.02	0.02	0.02	0.02
18.500	0.02	0.02	0.02	0.02
18.750	0.02	0.02	0.02	0.02
19.000	0.02	0.02	0.02	0.02
19.250	0.02	0.02	0.02	0.02
19.500	0.02	0.02	0.02	0.02
19.750	0.02	0.02	0.02	0.02
20.000	0.02	0.02	0.02	0.02
20.250	0.01	0.01	0.01	0.01
20.500	0.01	0.01	0.01	0.01
20.750	0.01	0.01	0.01	0.01
21.000	0.01	0.01	0.01	0.01
21.250	0.01	0.01	0.01	0.01
21.500	0.01	0.01	0.01	0.01
21.750	0.01	0.01	0.01	0.01
22.000	0.01	0.01	0.01	0.01
22.250	0.01	0.01	0.01	0.01
22.500	0.01	0.01	0.01	0.01
22.750	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft^3/s)
1.31
7.58
7.96
6.26
5.00
4.04
3.30
2.72
2.27
1.91
1.62
1.38
1.19
1.03
0.90
0.79
0.69
0.62
0.55
0.49
0.44
0.40
0.36
0.32
0.29
0.26
0.24
0.22
0.21
0.19
0.18
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.09
0.09
0.08
0.08

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft³/s)
0.08
0.07
0.07
0.07
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.03
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0.01
0.01
0.01
0.01

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.01
0.01
0.01
0.01
(N/A)

Subsection: Diverted Hydrograph

Label: Outlet-2

Return Event: 25 years

Storm Event: MoDOT Curves for O'Fallon - 25 Year

Peak Discharge	10.52 ft³/s
Time to Peak	0.550 hours
Hydrograph Volume	1.376 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.04	0.22	0.70
0.250	2.93	4.47	6.09	7.74
0.500	10.10	10.52	10.44	10.02
0.750	9.05	8.60	8.19	7.79
1.000	7.07	6.74	6.43	6.14
1.250	5.60	5.36	5.12	4.90
1.500	4.50	4.31	4.13	3.96
1.750	3.65	3.51	3.37	3.24
2.000	3.00	2.89	2.78	2.68
2.250	2.49	2.40	2.32	2.23
2.500	2.08	2.01	1.95	1.88
2.750	1.76	1.70	1.65	1.60
3.000	1.50	1.45	1.41	1.36
3.250	1.29	1.25	1.21	1.18
3.500	1.11	1.08	1.05	1.02
3.750	0.96	0.94	0.91	0.89
4.000	0.84	0.82	0.80	0.78
4.250	0.74	0.72	0.70	0.69
4.500	0.66	0.64	0.62	0.61
4.750	0.58	0.57	0.55	0.54
5.000	0.52	0.50	0.49	0.48
5.250	0.46	0.45	0.44	0.43
5.500	0.42	0.41	0.40	0.39
5.750	0.38	0.37	0.36	0.35
6.000	0.34	0.33	0.33	0.32
6.250	0.31	0.30	0.30	0.29
6.500	0.28	0.27	0.27	0.26
6.750	0.25	0.25	0.25	0.24
7.000	0.23	0.23	0.23	0.22
7.250	0.22	0.21	0.21	0.21
7.500	0.20	0.20	0.19	0.19
7.750	0.18	0.18	0.18	0.18
8.000	0.17	0.17	0.17	0.16
8.250	0.16	0.16	0.15	0.15
8.500	0.15	0.14	0.14	0.14
8.750	0.13	0.13	0.13	0.13
9.000	0.12	0.12	0.12	0.12
9.250	0.11	0.11	0.11	0.11
9.500	0.11	0.10	0.10	0.10
9.750	0.10	0.10	0.09	0.09
10.000	0.09	0.09	0.09	0.09
10.250	0.09	0.09	0.09	0.09
10.500	0.08	0.08	0.08	0.08
10.750	0.08	0.08	0.08	0.08

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.000	0.08	0.08	0.08	0.07
11.250	0.07	0.07	0.07	0.07
11.500	0.07	0.07	0.07	0.07
11.750	0.07	0.07	0.07	0.07
12.000	0.06	0.06	0.06	0.06
12.250	0.06	0.06	0.06	0.06
12.500	0.06	0.06	0.06	0.06
12.750	0.06	0.06	0.06	0.06
13.000	0.05	0.05	0.05	0.05
13.250	0.05	0.05	0.05	0.05
13.500	0.05	0.05	0.05	0.05
13.750	0.05	0.05	0.05	0.05
14.000	0.05	0.05	0.04	0.04
14.250	0.04	0.04	0.04	0.04
14.500	0.04	0.04	0.04	0.04
14.750	0.04	0.04	0.04	0.04
15.000	0.04	0.04	0.04	0.04
15.250	0.04	0.04	0.04	0.04
15.500	0.04	0.03	0.03	0.03
15.750	0.03	0.03	0.03	0.03
16.000	0.03	0.03	0.03	0.03
16.250	0.03	0.03	0.03	0.03
16.500	0.03	0.03	0.03	0.03
16.750	0.03	0.03	0.03	0.03
17.000	0.03	0.03	0.03	0.03
17.250	0.03	0.03	0.03	0.03
17.500	0.02	0.02	0.02	0.02
17.750	0.02	0.02	0.02	0.02
18.000	0.02	0.02	0.02	0.02
18.250	0.02	0.02	0.02	0.02
18.500	0.02	0.02	0.02	0.02
18.750	0.02	0.02	0.02	0.02
19.000	0.02	0.02	0.02	0.02
19.250	0.02	0.02	0.02	0.02
19.500	0.02	0.02	0.02	0.02
19.750	0.02	0.02	0.02	0.02
20.000	0.02	0.02	0.02	0.02
20.250	0.02	0.02	0.02	0.01
20.500	0.01	0.01	0.01	0.01
20.750	0.01	0.01	0.01	0.01
21.000	0.01	0.01	0.01	0.01
21.250	0.01	0.01	0.01	0.01
21.500	0.01	0.01	0.01	0.01
21.750	0.01	0.01	0.01	0.01
22.000	0.01	0.01	0.01	0.01
22.250	0.01	0.01	0.01	0.01
22.500	0.01	0.01	0.01	0.01
22.750	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft^3/s)
1.61
9.17
9.52
7.42
5.86
4.70
3.80
3.12
2.58
2.16
1.82
1.55
1.32
1.14
0.99
0.87
0.76
0.67
0.60
0.53
0.47
0.43
0.38
0.35
0.31
0.28
0.26
0.24
0.22
0.20
0.19
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.09
0.08
0.08

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft³/s)
0.08
0.07
0.07
0.07
0.07
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft³/s)
0.01
0.01
0.01
0.01
(N/A)

Subsection: Diverted Hydrograph
Label: Outlet-2

Return Event: 100 years
Storm Event: MoDOT Curves for O'Fallon - 100 Year

Peak Discharge	15.35 ft^3/s
Time to Peak	0.600 hours
Hydrograph Volume	1.871 ac-ft

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
0.000	0.00	0.05	0.30	0.99
0.250	4.05	6.14	8.32	10.53
0.500	14.22	15.13	15.35	14.92
0.750	13.39	12.68	12.02	11.39
1.000	10.25	9.74	9.25	8.79
1.250	7.96	7.58	7.22	6.89
1.500	6.27	5.98	5.72	5.46
1.750	5.00	4.78	4.58	4.39
2.000	4.04	3.87	3.72	3.57
2.250	3.30	3.17	3.05	2.93
2.500	2.72	2.62	2.53	2.44
2.750	2.27	2.19	2.11	2.04
3.000	1.91	1.85	1.78	1.73
3.250	1.62	1.57	1.52	1.47
3.500	1.38	1.34	1.30	1.26
3.750	1.19	1.16	1.12	1.09
4.000	1.03	1.00	0.98	0.95
4.250	0.90	0.88	0.85	0.83
4.500	0.79	0.77	0.75	0.73
4.750	0.69	0.68	0.66	0.65
5.000	0.62	0.60	0.59	0.57
5.250	0.55	0.53	0.52	0.51
5.500	0.49	0.48	0.47	0.46
5.750	0.44	0.43	0.42	0.41
6.000	0.40	0.39	0.38	0.37
6.250	0.36	0.35	0.34	0.34
6.500	0.32	0.32	0.31	0.30
6.750	0.29	0.29	0.28	0.27
7.000	0.26	0.26	0.26	0.25
7.250	0.24	0.24	0.24	0.23
7.500	0.22	0.22	0.22	0.21
7.750	0.21	0.20	0.20	0.20
8.000	0.19	0.19	0.19	0.18
8.250	0.18	0.17	0.17	0.17
8.500	0.16	0.16	0.16	0.16
8.750	0.15	0.15	0.15	0.14
9.000	0.14	0.14	0.14	0.13
9.250	0.13	0.13	0.13	0.12
9.500	0.12	0.12	0.12	0.11
9.750	0.11	0.11	0.11	0.11
10.000	0.10	0.10	0.10	0.10
10.250	0.09	0.09	0.09	0.09
10.500	0.09	0.09	0.09	0.09
10.750	0.09	0.09	0.08	0.08

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.000	0.08	0.08	0.08	0.08
11.250	0.08	0.08	0.08	0.08
11.500	0.08	0.07	0.07	0.07
11.750	0.07	0.07	0.07	0.07
12.000	0.07	0.07	0.07	0.07
12.250	0.07	0.07	0.06	0.06
12.500	0.06	0.06	0.06	0.06
12.750	0.06	0.06	0.06	0.06
13.000	0.06	0.06	0.06	0.06
13.250	0.06	0.05	0.05	0.05
13.500	0.05	0.05	0.05	0.05
13.750	0.05	0.05	0.05	0.05
14.000	0.05	0.05	0.05	0.05
14.250	0.05	0.05	0.05	0.05
14.500	0.04	0.04	0.04	0.04
14.750	0.04	0.04	0.04	0.04
15.000	0.04	0.04	0.04	0.04
15.250	0.04	0.04	0.04	0.04
15.500	0.04	0.04	0.04	0.04
15.750	0.04	0.04	0.04	0.03
16.000	0.03	0.03	0.03	0.03
16.250	0.03	0.03	0.03	0.03
16.500	0.03	0.03	0.03	0.03
16.750	0.03	0.03	0.03	0.03
17.000	0.03	0.03	0.03	0.03
17.250	0.03	0.03	0.03	0.03
17.500	0.03	0.03	0.03	0.03
17.750	0.03	0.03	0.02	0.02
18.000	0.02	0.02	0.02	0.02
18.250	0.02	0.02	0.02	0.02
18.500	0.02	0.02	0.02	0.02
18.750	0.02	0.02	0.02	0.02
19.000	0.02	0.02	0.02	0.02
19.250	0.02	0.02	0.02	0.02
19.500	0.02	0.02	0.02	0.02
19.750	0.02	0.02	0.02	0.02
20.000	0.02	0.02	0.02	0.02
20.250	0.02	0.02	0.02	0.02
20.500	0.02	0.02	0.02	0.02
20.750	0.01	0.01	0.01	0.01
21.000	0.01	0.01	0.01	0.01
21.250	0.01	0.01	0.01	0.01
21.500	0.01	0.01	0.01	0.01
21.750	0.01	0.01	0.01	0.01
22.000	0.01	0.01	0.01	0.01
22.250	0.01	0.01	0.01	0.01
22.500	0.01	0.01	0.01	0.01
22.750	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01

Subsection: Diverted Hydrograph
Label: Outlet-2

Return Event: 100 years
Storm Event: MoDOT Curves for O'Fallon - 100 Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft³/s)
2.25
12.61
14.15
10.80
8.36
6.57
5.23
4.21
3.43
2.83
2.35
1.97
1.67
1.43
1.23
1.06
0.92
0.81
0.71
0.63
0.56
0.50
0.45
0.40
0.36
0.33
0.30
0.27
0.25
0.23
0.21
0.19
0.18
0.17
0.15
0.14
0.13
0.12
0.11
0.10
0.10
0.09
0.09

Subsection: Diverted Hydrograph

Label: Outlet-2

Return Event: 100 years

Storm Event: MoDOT Curves for O'Fallon - 100 Year

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.08
0.08
0.08
0.07
0.07
0.07
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.01
0.01
0.01
0.01
(N/A)

Subsection: Elevation-Volume-Flow Table (Pond)

Label: POND 2

Return Event: 2 years

Storm Event: MoDOT Curves for O'Fallon - 2 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	496.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ac-ft)	Area (acres)	Infiltration (ft³/s)
496.00	0.00	0.000	0.438	0.00
496.10	0.09	0.044	0.442	0.00
496.20	0.26	0.088	0.446	0.00
496.30	0.48	0.133	0.450	0.00
496.40	0.74	0.178	0.454	0.00
496.50	1.04	0.224	0.458	0.00
496.60	1.37	0.270	0.462	0.00
496.70	1.72	0.316	0.466	0.00
496.80	2.11	0.363	0.470	0.00
496.90	2.51	0.410	0.474	0.00
497.00	2.94	0.458	0.478	0.00
497.10	3.40	0.506	0.482	0.00
497.20	3.87	0.554	0.486	0.00
497.30	4.36	0.603	0.491	0.00
497.40	4.88	0.652	0.495	0.00
497.50	5.41	0.702	0.499	0.00
497.60	5.96	0.752	0.503	0.00
497.70	6.53	0.803	0.507	0.00
497.80	7.11	0.854	0.512	0.00
497.90	7.71	0.905	0.516	0.00
498.00	8.33	0.957	0.520	0.00
498.10	8.97	1.009	0.525	0.00
498.20	9.62	1.062	0.529	0.00
498.30	10.28	1.115	0.533	0.00
498.40	10.96	1.168	0.538	0.00
498.50	11.65	1.222	0.542	0.00
498.60	12.36	1.277	0.546	0.00
498.70	13.08	1.331	0.551	0.00
498.80	13.81	1.387	0.555	0.00
498.90	14.56	1.442	0.560	0.00
499.00	15.32	1.499	0.564	0.00
499.10	16.10	1.555	0.568	0.00
499.20	16.89	1.612	0.573	0.00
499.30	17.68	1.670	0.578	0.00
499.40	18.50	1.728	0.582	0.00
499.50	19.32	1.786	0.587	0.00

Elevation (ft)	Outflow (ft³/s)	Storage (ac-ft)	Area (acres)	Infiltration (ft³/s)
499.60	20.16	1.845	0.591	0.00
499.70	21.00	1.905	0.596	0.00
499.80	21.86	1.964	0.600	0.00
499.90	22.73	2.025	0.605	0.00
500.00	23.62	2.085	0.610	0.00
500.10	24.51	2.147	0.616	0.00
500.20	25.42	2.209	0.623	0.00
500.30	26.33	2.271	0.629	0.00
500.40	27.26	2.334	0.636	0.00
500.50	28.20	2.398	0.642	0.00
500.60	29.14	2.463	0.649	0.00
500.70	30.10	2.528	0.655	0.00
500.80	31.07	2.594	0.662	0.00
500.90	32.05	2.660	0.669	0.00
501.00	33.04	2.728	0.675	0.00
501.10	34.04	2.797	0.710	0.00
501.20	35.05	2.870	0.746	0.00
501.30	36.07	2.946	0.782	0.00
501.40	37.10	3.026	0.820	0.00
501.50	38.14	3.110	0.858	0.00
501.60	39.19	3.198	0.897	0.00
501.70	40.24	3.289	0.937	0.00
501.80	41.31	3.385	0.978	0.00
501.90	42.39	3.485	1.019	0.00
502.00	43.48	3.589	1.062	0.00
502.10	44.57	3.697	1.100	0.00
502.20	45.68	3.809	1.139	0.00
502.30	46.79	3.925	1.178	0.00
502.40	47.92	4.045	1.218	0.00
502.50	49.05	4.169	1.259	0.00
502.60	50.19	4.297	1.301	0.00
502.70	51.34	4.429	1.343	0.00
502.80	52.50	4.565	1.386	0.00
502.90	53.67	4.706	1.429	0.00
503.00	54.84	4.851	1.473	0.00

Flow (Total) (ft³/s)	2S/t + O (ft³/s)
0.00	0.00
0.09	21.37
0.26	43.01
0.48	64.89
0.74	87.01
1.04	109.36
1.37	131.93
1.72	154.73
2.11	177.75
2.51	201.00
2.94	224.47
3.40	248.16
3.87	272.08

Subsection: Elevation-Volume-Flow Table (Pond)

Label: POND 2

Return Event: 2 years
Storm Event: MoDOT Curves for O'Fallon - 2 Year

Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
4.36	296.21
4.88	320.57
5.41	345.14
5.96	369.94
6.53	394.97
7.11	420.21
7.71	445.68
8.33	471.37
8.97	497.29
9.62	523.43
10.28	549.79
10.96	576.38
11.65	603.19
12.36	630.23
13.08	657.50
13.81	684.99
14.56	712.71
15.32	740.66
16.10	768.84
16.89	797.25
17.68	825.90
18.50	854.77
19.32	883.88
20.16	913.22
21.00	942.79
21.86	972.60
22.73	1,002.64
23.62	1,032.92
24.51	1,063.48
25.42	1,094.37
26.33	1,125.57
27.26	1,157.11
28.20	1,188.97
29.14	1,221.16
30.10	1,253.67
31.07	1,286.53
32.05	1,319.71
33.04	1,353.23
34.04	1,387.76
35.05	1,424.00
36.07	1,461.99
37.10	1,501.78
38.14	1,543.41
39.19	1,586.92
40.24	1,632.35
41.31	1,679.75
42.39	1,729.15
43.48	1,780.60
44.57	1,834.01
45.68	1,889.29

Flow (Total) (ft³/s)	2S/t + O (ft³/s)
46.79	1,946.47
47.92	2,005.59
49.05	2,066.68
50.19	2,129.76
51.34	2,194.88
52.50	2,262.06
53.67	2,331.33
54.84	2,402.74

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	496.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ac-ft)	Area (acres)	Infiltration (ft³/s)
496.00	0.00	0.000	0.438	0.00
496.10	0.09	0.044	0.442	0.00
496.20	0.26	0.088	0.446	0.00
496.30	0.48	0.133	0.450	0.00
496.40	0.74	0.178	0.454	0.00
496.50	1.04	0.224	0.458	0.00
496.60	1.37	0.270	0.462	0.00
496.70	1.72	0.316	0.466	0.00
496.80	2.11	0.363	0.470	0.00
496.90	2.51	0.410	0.474	0.00
497.00	2.94	0.458	0.478	0.00
497.10	3.40	0.506	0.482	0.00
497.20	3.87	0.554	0.486	0.00
497.30	4.36	0.603	0.491	0.00
497.40	4.88	0.652	0.495	0.00
497.50	5.41	0.702	0.499	0.00
497.60	5.96	0.752	0.503	0.00
497.70	6.53	0.803	0.507	0.00
497.80	7.11	0.854	0.512	0.00
497.90	7.71	0.905	0.516	0.00
498.00	8.33	0.957	0.520	0.00
498.10	8.97	1.009	0.525	0.00
498.20	9.62	1.062	0.529	0.00
498.30	10.28	1.115	0.533	0.00
498.40	10.96	1.168	0.538	0.00
498.50	11.65	1.222	0.542	0.00
498.60	12.36	1.277	0.546	0.00
498.70	13.08	1.331	0.551	0.00
498.80	13.81	1.387	0.555	0.00
498.90	14.56	1.442	0.560	0.00
499.00	15.32	1.499	0.564	0.00
499.10	16.10	1.555	0.568	0.00
499.20	16.89	1.612	0.573	0.00
499.30	17.68	1.670	0.578	0.00
499.40	18.50	1.728	0.582	0.00
499.50	19.32	1.786	0.587	0.00

Subsection: Elevation-Volume-Flow Table (Pond)

Label: POND 2

Return Event: 15 years

Storm Event: MoDOT Curves for O'Fallon - 15 Year

Elevation (ft)	Outflow (ft^3/s)	Storage (ac-ft)	Area (acres)	Infiltration (ft^3/s)
499.60	20.16	1.845	0.591	0.00
499.70	21.00	1.905	0.596	0.00
499.80	21.86	1.964	0.600	0.00
499.90	22.73	2.025	0.605	0.00
500.00	23.62	2.085	0.610	0.00
500.10	24.51	2.147	0.616	0.00
500.20	25.42	2.209	0.623	0.00
500.30	26.33	2.271	0.629	0.00
500.40	27.26	2.334	0.636	0.00
500.50	28.20	2.398	0.642	0.00
500.60	29.14	2.463	0.649	0.00
500.70	30.10	2.528	0.655	0.00
500.80	31.07	2.594	0.662	0.00
500.90	32.05	2.660	0.669	0.00
501.00	33.04	2.728	0.675	0.00
501.10	34.04	2.797	0.710	0.00
501.20	35.05	2.870	0.746	0.00
501.30	36.07	2.946	0.782	0.00
501.40	37.10	3.026	0.820	0.00
501.50	38.14	3.110	0.858	0.00
501.60	39.19	3.198	0.897	0.00
501.70	40.24	3.289	0.937	0.00
501.80	41.31	3.385	0.978	0.00
501.90	42.39	3.485	1.019	0.00
502.00	43.48	3.589	1.062	0.00
502.10	44.57	3.697	1.100	0.00
502.20	45.68	3.809	1.139	0.00
502.30	46.79	3.925	1.178	0.00
502.40	47.92	4.045	1.218	0.00
502.50	49.05	4.169	1.259	0.00
502.60	50.19	4.297	1.301	0.00
502.70	51.34	4.429	1.343	0.00
502.80	52.50	4.565	1.386	0.00
502.90	53.67	4.706	1.429	0.00
503.00	54.84	4.851	1.473	0.00

Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
0.00	0.00
0.09	21.37
0.26	43.01
0.48	64.89
0.74	87.01
1.04	109.36
1.37	131.93
1.72	154.73
2.11	177.75
2.51	201.00
2.94	224.47
3.40	248.16
3.87	272.08

Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
4.36	296.21
4.88	320.57
5.41	345.14
5.96	369.94
6.53	394.97
7.11	420.21
7.71	445.68
8.33	471.37
8.97	497.29
9.62	523.43
10.28	549.79
10.96	576.38
11.65	603.19
12.36	630.23
13.08	657.50
13.81	684.99
14.56	712.71
15.32	740.66
16.10	768.84
16.89	797.25
17.68	825.90
18.50	854.77
19.32	883.88
20.16	913.22
21.00	942.79
21.86	972.60
22.73	1,002.64
23.62	1,032.92
24.51	1,063.48
25.42	1,094.37
26.33	1,125.57
27.26	1,157.11
28.20	1,188.97
29.14	1,221.16
30.10	1,253.67
31.07	1,286.53
32.05	1,319.71
33.04	1,353.23
34.04	1,387.76
35.05	1,424.00
36.07	1,461.99
37.10	1,501.78
38.14	1,543.41
39.19	1,586.92
40.24	1,632.35
41.31	1,679.75
42.39	1,729.15
43.48	1,780.60
44.57	1,834.01
45.68	1,889.29

Flow (Total) (ft^3/s)	2S/t + O (ft^3/s)
46.79	1,946.47
47.92	2,005.59
49.05	2,066.68
50.19	2,129.76
51.34	2,194.88
52.50	2,262.06
53.67	2,331.33
54.84	2,402.74

Infiltration	
Infiltration Method (Computed)	No Infiltration

Approximate Detention Times	
Time to Peak (Outflow + Infiltration, Peak to Peak Detention Time)	0.550 hours
Time to Peak (Inflow, Peak to Peak Detention Time)	0.250 hours
Detention Time (Peak to Peak)	0.300 hours
Time to Centroid (Outflow)	2.818 hours
Time to Centroid (Inflow)	0.288 hours
Detention Time (Centroid to Centroid)	2.530 hours
Weighted Average Plug Time	3.398 hours
Maximum Plug Volume Plug Time	1.473 hours
Maximum Inflow Plug Volume	0.096 ac-ft
Time (Maximum Plug Volume, Start)	0.250 hours
Time (Maximum Plug Volume, End)	0.300 hours

Subsection: Level Pool Pond Routing Summary

Label: POND 2 (IN)

Return Event: 2 years

Storm Event: MoDOT Curves for O'Fallon - 2 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	496.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	23.26 ft³/s	Time to Peak (Flow, In)	0.250 hours
Flow (Peak Outlet)	4.16 ft³/s	Time to Peak (Flow, Outlet)	0.550 hours

Elevation (Water Surface, Peak)	497.26 ft
Volume (Peak)	0.583 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.673 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.670 ac-ft
Volume (Retained)	0.003 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Approximate Detention Times	
Time to Peak (Outflow + Infiltration, Peak to Peak Detention Time)	0.550 hours
Time to Peak (Inflow, Peak to Peak Detention Time)	0.250 hours
Detention Time (Peak to Peak)	0.300 hours
Time to Centroid (Outflow)	2.360 hours
Time to Centroid (Inflow)	0.313 hours
Detention Time (Centroid to Centroid)	2.047 hours
Weighted Average Plug Time	2.718 hours
Maximum Plug Volume Plug Time	0.968 hours
Maximum Inflow Plug Volume	0.149 ac-ft
Time (Maximum Plug Volume, Start)	0.250 hours
Time (Maximum Plug Volume, End)	0.300 hours

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	496.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	36.14 ft³/s	Time to Peak (Flow, In)	0.250 hours
Flow (Peak Outlet)	8.74 ft³/s	Time to Peak (Flow, Outlet)	0.550 hours

Elevation (Water Surface, Peak)	498.06 ft
Volume (Peak)	0.990 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	1.195 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	1.191 ac-ft
Volume (Retained)	0.004 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Approximate Detention Times	
Time to Peak (Outflow + Infiltration, Peak to Peak Detention Time)	0.550 hours
Time to Peak (Inflow, Peak to Peak Detention Time)	0.250 hours
Detention Time (Peak to Peak)	0.300 hours
Time to Centroid (Outflow)	2.254 hours
Time to Centroid (Inflow)	0.313 hours
Detention Time (Centroid to Centroid)	1.941 hours
Weighted Average Plug Time	2.578 hours
Maximum Plug Volume Plug Time	0.918 hours
Maximum Inflow Plug Volume	0.172 ac-ft
Time (Maximum Plug Volume, Start)	0.250 hours
Time (Maximum Plug Volume, End)	0.300 hours

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	496.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	41.73 ft³/s	Time to Peak (Flow, In)	0.250 hours
Flow (Peak Outlet)	10.52 ft³/s	Time to Peak (Flow, Outlet)	0.550 hours

Elevation (Water Surface, Peak)	498.34 ft
Volume (Peak)	1.134 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	1.380 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	1.376 ac-ft
Volume (Retained)	0.004 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Infiltration	
Infiltration Method (Computed)	No Infiltration

Approximate Detention Times	
Time to Peak (Outflow + Infiltration, Peak to Peak Detention Time)	0.600 hours
Time to Peak (Inflow, Peak to Peak Detention Time)	0.250 hours
Detention Time (Peak to Peak)	0.350 hours
Time to Centroid (Outflow)	2.068 hours
Time to Centroid (Inflow)	0.329 hours
Detention Time (Centroid to Centroid)	1.739 hours
Weighted Average Plug Time	2.333 hours
Maximum Plug Volume Plug Time	0.762 hours
Maximum Inflow Plug Volume	0.217 ac-ft
Time (Maximum Plug Volume, Start)	0.250 hours
Time (Maximum Plug Volume, End)	0.300 hours

Infiltration	
Infiltration Method (Computed)	No Infiltration

Initial Conditions	
Elevation (Water Surface, Initial)	496.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft³/s
Flow (Initial Infiltration)	0.00 ft³/s
Flow (Initial, Total)	0.00 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	52.59 ft³/s	Time to Peak (Flow, In)	0.250 hours
Flow (Peak Outlet)	15.35 ft³/s	Time to Peak (Flow, Outlet)	0.600 hours

Elevation (Water Surface, Peak)	499.00 ft
Volume (Peak)	1.501 ac-ft

Mass Balance (ac-ft)	
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	1.875 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	1.871 ac-ft
Volume (Retained)	0.004 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

Subsection: Pond Routed Hydrograph (total out)
Label: POND 2 (OUT)

Return Event: 2 years
Storm Event: MoDOT Curves for O'Fallon - 2 Year

Peak Discharge	4.16 ft^3/s
Time to Peak	0.550 hours
Hydrograph Volume	0.670 ac-ft

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
0.000	0.00	0.02	0.09	0.30
0.250	1.27	1.96	2.71	3.39
0.500	4.13	4.16	4.04	3.88
0.750	3.58	3.43	3.30	3.18
1.000	2.94	2.83	2.73	2.63
1.250	2.44	2.35	2.27	2.19
1.500	2.04	1.98	1.91	1.85
1.750	1.73	1.67	1.62	1.57
2.000	1.47	1.43	1.38	1.34
2.250	1.27	1.23	1.19	1.16
2.500	1.09	1.06	1.03	1.00
2.750	0.95	0.93	0.90	0.88
3.000	0.83	0.81	0.79	0.77
3.250	0.73	0.71	0.69	0.68
3.500	0.65	0.63	0.62	0.60
3.750	0.57	0.56	0.55	0.53
4.000	0.51	0.50	0.49	0.48
4.250	0.46	0.45	0.44	0.43
4.500	0.41	0.40	0.40	0.39
4.750	0.37	0.37	0.36	0.35
5.000	0.34	0.33	0.32	0.32
5.250	0.30	0.30	0.29	0.29
5.500	0.27	0.27	0.26	0.26
5.750	0.25	0.25	0.24	0.24
6.000	0.23	0.23	0.22	0.22
6.250	0.21	0.21	0.21	0.20
6.500	0.20	0.20	0.19	0.19
6.750	0.18	0.18	0.18	0.17
7.000	0.17	0.17	0.16	0.16
7.250	0.16	0.15	0.15	0.15
7.500	0.14	0.14	0.14	0.14
7.750	0.13	0.13	0.13	0.13
8.000	0.12	0.12	0.12	0.12
8.250	0.11	0.11	0.11	0.11
8.500	0.11	0.10	0.10	0.10
8.750	0.10	0.10	0.09	0.09
9.000	0.09	0.09	0.09	0.09
9.250	0.09	0.09	0.09	0.09
9.500	0.08	0.08	0.08	0.08
9.750	0.08	0.08	0.08	0.08
10.000	0.08	0.08	0.08	0.07
10.250	0.07	0.07	0.07	0.07
10.500	0.07	0.07	0.07	0.07
10.750	0.07	0.07	0.07	0.07

Subsection: Pond Routed Hydrograph (total out)

Label: POND 2 (OUT)

Return Event: 2 years

Storm Event: MoDOT Curves for O'Fallon - 2 Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.000	0.06	0.06	0.06	0.06	
11.250	0.06	0.06	0.06	0.06	
11.500	0.06	0.06	0.06	0.06	
11.750	0.06	0.06	0.06	0.05	
12.000	0.05	0.05	0.05	0.05	
12.250	0.05	0.05	0.05	0.05	
12.500	0.05	0.05	0.05	0.05	
12.750	0.05	0.05	0.05	0.05	
13.000	0.05	0.04	0.04	0.04	
13.250	0.04	0.04	0.04	0.04	
13.500	0.04	0.04	0.04	0.04	
13.750	0.04	0.04	0.04	0.04	
14.000	0.04	0.04	0.04	0.04	
14.250	0.04	0.04	0.04	0.04	
14.500	0.03	0.03	0.03	0.03	
14.750	0.03	0.03	0.03	0.03	
15.000	0.03	0.03	0.03	0.03	
15.250	0.03	0.03	0.03	0.03	
15.500	0.03	0.03	0.03	0.03	
15.750	0.03	0.03	0.03	0.03	
16.000	0.03	0.03	0.03	0.03	
16.250	0.03	0.03	0.03	0.03	
16.500	0.02	0.02	0.02	0.02	
16.750	0.02	0.02	0.02	0.02	
17.000	0.02	0.02	0.02	0.02	
17.250	0.02	0.02	0.02	0.02	
17.500	0.02	0.02	0.02	0.02	
17.750	0.02	0.02	0.02	0.02	
18.000	0.02	0.02	0.02	0.02	
18.250	0.02	0.02	0.02	0.02	
18.500	0.02	0.02	0.02	0.02	
18.750	0.02	0.02	0.02	0.02	
19.000	0.02	0.02	0.02	0.02	
19.250	0.02	0.02	0.01	0.01	
19.500	0.01	0.01	0.01	0.01	
19.750	0.01	0.01	0.01	0.01	
20.000	0.01	0.01	0.01	0.01	
20.250	0.01	0.01	0.01	0.01	
20.500	0.01	0.01	0.01	0.01	
20.750	0.01	0.01	0.01	0.01	
21.000	0.01	0.01	0.01	0.01	
21.250	0.01	0.01	0.01	0.01	
21.500	0.01	0.01	0.01	0.01	
21.750	0.01	0.01	0.01	0.01	
22.000	0.01	0.01	0.01	0.01	
22.250	0.01	0.01	0.01	0.01	
22.500	0.01	0.01	0.01	0.01	
22.750	0.01	0.01	0.01	0.01	
23.000	0.01	0.01	0.01	0.01	

Subsection: Pond Routed Hydrograph (total out)
Label: POND 2 (OUT)

Return Event: 2 years
Storm Event: MoDOT Curves for O'Fallon - 2 Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft³/s)
0.69
3.87
3.72
3.05
2.53
2.12
1.79
1.52
1.30
1.12
0.98
0.85
0.75
0.66
0.59
0.52
0.47
0.42
0.38
0.34
0.31
0.28
0.26
0.24
0.22
0.20
0.19
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.09
0.08
0.08
0.08
0.07
0.07
0.07

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft³/s)
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.05
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0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.01
0.01
0.01
0.01
(N/A)

Peak Discharge	8.74 ft³/s
Time to Peak	0.550 hours
Hydrograph Volume	1.191 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.04	0.18	0.57
0.250	2.39	3.66	5.00	6.38
0.500	8.37	8.74	8.69	8.36
0.750	7.58	7.22	6.88	6.56
1.000	5.98	5.71	5.46	5.22
1.250	4.78	4.58	4.39	4.21
1.500	3.87	3.72	3.57	3.43
1.750	3.17	3.05	2.93	2.82
2.000	2.62	2.53	2.44	2.35
2.250	2.19	2.11	2.04	1.97
2.500	1.85	1.78	1.72	1.67
2.750	1.57	1.52	1.47	1.43
3.000	1.34	1.30	1.26	1.23
3.250	1.16	1.12	1.09	1.06
3.500	1.00	0.98	0.95	0.92
3.750	0.88	0.85	0.83	0.81
4.000	0.77	0.75	0.73	0.71
4.250	0.68	0.66	0.65	0.63
4.500	0.60	0.59	0.57	0.56
4.750	0.53	0.52	0.51	0.50
5.000	0.48	0.47	0.46	0.45
5.250	0.43	0.42	0.41	0.40
5.500	0.39	0.38	0.37	0.36
5.750	0.35	0.34	0.34	0.33
6.000	0.32	0.31	0.30	0.30
6.250	0.29	0.28	0.27	0.27
6.500	0.26	0.26	0.25	0.25
6.750	0.24	0.24	0.23	0.23
7.000	0.22	0.22	0.21	0.21
7.250	0.20	0.20	0.20	0.19
7.500	0.19	0.19	0.18	0.18
7.750	0.17	0.17	0.17	0.17
8.000	0.16	0.16	0.16	0.15
8.250	0.15	0.15	0.14	0.14
8.500	0.14	0.14	0.13	0.13
8.750	0.13	0.13	0.12	0.12
9.000	0.12	0.12	0.11	0.11
9.250	0.11	0.11	0.11	0.10
9.500	0.10	0.10	0.10	0.10
9.750	0.09	0.09	0.09	0.09
10.000	0.09	0.09	0.09	0.09
10.250	0.09	0.08	0.08	0.08
10.500	0.08	0.08	0.08	0.08
10.750	0.08	0.08	0.08	0.08

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
11.000	0.07	0.07	0.07	0.07	
11.250	0.07	0.07	0.07	0.07	
11.500	0.07	0.07	0.07	0.07	
11.750	0.07	0.06	0.06	0.06	
12.000	0.06	0.06	0.06	0.06	
12.250	0.06	0.06	0.06	0.06	
12.500	0.06	0.06	0.06	0.06	
12.750	0.05	0.05	0.05	0.05	
13.000	0.05	0.05	0.05	0.05	
13.250	0.05	0.05	0.05	0.05	
13.500	0.05	0.05	0.05	0.05	
13.750	0.05	0.05	0.05	0.04	
14.000	0.04	0.04	0.04	0.04	
14.250	0.04	0.04	0.04	0.04	
14.500	0.04	0.04	0.04	0.04	
14.750	0.04	0.04	0.04	0.04	
15.000	0.04	0.04	0.04	0.04	
15.250	0.04	0.04	0.03	0.03	
15.500	0.03	0.03	0.03	0.03	
15.750	0.03	0.03	0.03	0.03	
16.000	0.03	0.03	0.03	0.03	
16.250	0.03	0.03	0.03	0.03	
16.500	0.03	0.03	0.03	0.03	
16.750	0.03	0.03	0.03	0.03	
17.000	0.03	0.03	0.03	0.03	
17.250	0.03	0.02	0.02	0.02	
17.500	0.02	0.02	0.02	0.02	
17.750	0.02	0.02	0.02	0.02	
18.000	0.02	0.02	0.02	0.02	
18.250	0.02	0.02	0.02	0.02	
18.500	0.02	0.02	0.02	0.02	
18.750	0.02	0.02	0.02	0.02	
19.000	0.02	0.02	0.02	0.02	
19.250	0.02	0.02	0.02	0.02	
19.500	0.02	0.02	0.02	0.02	
19.750	0.02	0.02	0.02	0.02	
20.000	0.02	0.02	0.02	0.02	
20.250	0.01	0.01	0.01	0.01	
20.500	0.01	0.01	0.01	0.01	
20.750	0.01	0.01	0.01	0.01	
21.000	0.01	0.01	0.01	0.01	
21.250	0.01	0.01	0.01	0.01	
21.500	0.01	0.01	0.01	0.01	
21.750	0.01	0.01	0.01	0.01	
22.000	0.01	0.01	0.01	0.01	
22.250	0.01	0.01	0.01	0.01	
22.500	0.01	0.01	0.01	0.01	
22.750	0.01	0.01	0.01	0.01	
23.000	0.01	0.01	0.01	0.01	

Subsection: Pond Routed Hydrograph (total out)
Label: POND 2 (OUT)

Return Event: 15 years
Storm Event: MoDOT Curves for O'Fallon - 15 Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft³/s)
1.31
7.58
7.96
6.26
5.00
4.04
3.30
2.72
2.27
1.91
1.62
1.38
1.19
1.03
0.90
0.79
0.69
0.62
0.55
0.49
0.44
0.40
0.36
0.32
0.29
0.26
0.24
0.22
0.21
0.19
0.18
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.09
0.09
0.08
0.08

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.08
0.07
0.07
0.07
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.02
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0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.01
0.01
0.01
0.01
(N/A)

Subsection: Pond Routed Hydrograph (total out)
Label: POND 2 (OUT)

Return Event: 25 years
Storm Event: MoDOT Curves for O'Fallon - 25 Year

Peak Discharge	10.52 ft³/s
Time to Peak	0.550 hours
Hydrograph Volume	1.376 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.04	0.22	0.70
0.250	2.93	4.47	6.09	7.74
0.500	10.10	10.52	10.44	10.02
0.750	9.05	8.60	8.19	7.79
1.000	7.07	6.74	6.43	6.14
1.250	5.60	5.36	5.12	4.90
1.500	4.50	4.31	4.13	3.96
1.750	3.65	3.51	3.37	3.24
2.000	3.00	2.89	2.78	2.68
2.250	2.49	2.40	2.32	2.23
2.500	2.08	2.01	1.95	1.88
2.750	1.76	1.70	1.65	1.60
3.000	1.50	1.45	1.41	1.36
3.250	1.29	1.25	1.21	1.18
3.500	1.11	1.08	1.05	1.02
3.750	0.96	0.94	0.91	0.89
4.000	0.84	0.82	0.80	0.78
4.250	0.74	0.72	0.70	0.69
4.500	0.66	0.64	0.62	0.61
4.750	0.58	0.57	0.55	0.54
5.000	0.52	0.50	0.49	0.48
5.250	0.46	0.45	0.44	0.43
5.500	0.42	0.41	0.40	0.39
5.750	0.38	0.37	0.36	0.35
6.000	0.34	0.33	0.33	0.32
6.250	0.31	0.30	0.30	0.29
6.500	0.28	0.27	0.27	0.26
6.750	0.25	0.25	0.25	0.24
7.000	0.23	0.23	0.23	0.22
7.250	0.22	0.21	0.21	0.21
7.500	0.20	0.20	0.19	0.19
7.750	0.18	0.18	0.18	0.18
8.000	0.17	0.17	0.17	0.16
8.250	0.16	0.16	0.15	0.15
8.500	0.15	0.14	0.14	0.14
8.750	0.13	0.13	0.13	0.13
9.000	0.12	0.12	0.12	0.12
9.250	0.11	0.11	0.11	0.11
9.500	0.11	0.10	0.10	0.10
9.750	0.10	0.10	0.09	0.09
10.000	0.09	0.09	0.09	0.09
10.250	0.09	0.09	0.09	0.09
10.500	0.08	0.08	0.08	0.08
10.750	0.08	0.08	0.08	0.08

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.000	0.08	0.08	0.08	0.07
11.250	0.07	0.07	0.07	0.07
11.500	0.07	0.07	0.07	0.07
11.750	0.07	0.07	0.07	0.07
12.000	0.06	0.06	0.06	0.06
12.250	0.06	0.06	0.06	0.06
12.500	0.06	0.06	0.06	0.06
12.750	0.06	0.06	0.06	0.06
13.000	0.05	0.05	0.05	0.05
13.250	0.05	0.05	0.05	0.05
13.500	0.05	0.05	0.05	0.05
13.750	0.05	0.05	0.05	0.05
14.000	0.05	0.05	0.04	0.04
14.250	0.04	0.04	0.04	0.04
14.500	0.04	0.04	0.04	0.04
14.750	0.04	0.04	0.04	0.04
15.000	0.04	0.04	0.04	0.04
15.250	0.04	0.04	0.04	0.04
15.500	0.04	0.03	0.03	0.03
15.750	0.03	0.03	0.03	0.03
16.000	0.03	0.03	0.03	0.03
16.250	0.03	0.03	0.03	0.03
16.500	0.03	0.03	0.03	0.03
16.750	0.03	0.03	0.03	0.03
17.000	0.03	0.03	0.03	0.03
17.250	0.03	0.03	0.03	0.03
17.500	0.02	0.02	0.02	0.02
17.750	0.02	0.02	0.02	0.02
18.000	0.02	0.02	0.02	0.02
18.250	0.02	0.02	0.02	0.02
18.500	0.02	0.02	0.02	0.02
18.750	0.02	0.02	0.02	0.02
19.000	0.02	0.02	0.02	0.02
19.250	0.02	0.02	0.02	0.02
19.500	0.02	0.02	0.02	0.02
19.750	0.02	0.02	0.02	0.02
20.000	0.02	0.02	0.02	0.02
20.250	0.02	0.02	0.02	0.01
20.500	0.01	0.01	0.01	0.01
20.750	0.01	0.01	0.01	0.01
21.000	0.01	0.01	0.01	0.01
21.250	0.01	0.01	0.01	0.01
21.500	0.01	0.01	0.01	0.01
21.750	0.01	0.01	0.01	0.01
22.000	0.01	0.01	0.01	0.01
22.250	0.01	0.01	0.01	0.01
22.500	0.01	0.01	0.01	0.01
22.750	0.01	0.01	0.01	0.01
23.000	0.01	0.01	0.01	0.01

Subsection: Pond Routed Hydrograph (total out)

Label: POND 2 (OUT)

Return Event: 25 years

Storm Event: MoDOT Curves for O'Fallon - 25 Year

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft^3/s)
1.61
9.17
9.52
7.42
5.86
4.70
3.80
3.12
2.58
2.16
1.82
1.55
1.32
1.14
0.99
0.87
0.76
0.67
0.60
0.53
0.47
0.43
0.38
0.35
0.31
0.28
0.26
0.24
0.22
0.20
0.19
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.09
0.08
0.08

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft³/s)
0.08
0.07
0.07
0.07
0.07
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft^3/s)
0.01
0.01
0.01
0.01
(N/A)

Peak Discharge	15.35 ft³/s
Time to Peak	0.600 hours
Hydrograph Volume	1.871 ac-ft

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00	0.05	0.30	0.99
0.250	4.05	6.14	8.32	10.53
0.500	14.22	15.13	15.35	14.92
0.750	13.39	12.68	12.02	11.39
1.000	10.25	9.74	9.25	8.79
1.250	7.96	7.58	7.22	6.89
1.500	6.27	5.98	5.72	5.46
1.750	5.00	4.78	4.58	4.39
2.000	4.04	3.87	3.72	3.57
2.250	3.30	3.17	3.05	2.93
2.500	2.72	2.62	2.53	2.44
2.750	2.27	2.19	2.11	2.04
3.000	1.91	1.85	1.78	1.73
3.250	1.62	1.57	1.52	1.47
3.500	1.38	1.34	1.30	1.26
3.750	1.19	1.16	1.12	1.09
4.000	1.03	1.00	0.98	0.95
4.250	0.90	0.88	0.85	0.83
4.500	0.79	0.77	0.75	0.73
4.750	0.69	0.68	0.66	0.65
5.000	0.62	0.60	0.59	0.57
5.250	0.55	0.53	0.52	0.51
5.500	0.49	0.48	0.47	0.46
5.750	0.44	0.43	0.42	0.41
6.000	0.40	0.39	0.38	0.37
6.250	0.36	0.35	0.34	0.34
6.500	0.32	0.32	0.31	0.30
6.750	0.29	0.29	0.28	0.27
7.000	0.26	0.26	0.26	0.25
7.250	0.24	0.24	0.24	0.23
7.500	0.22	0.22	0.22	0.21
7.750	0.21	0.20	0.20	0.20
8.000	0.19	0.19	0.19	0.18
8.250	0.18	0.17	0.17	0.17
8.500	0.16	0.16	0.16	0.16
8.750	0.15	0.15	0.15	0.14
9.000	0.14	0.14	0.14	0.13
9.250	0.13	0.13	0.13	0.12
9.500	0.12	0.12	0.12	0.11
9.750	0.11	0.11	0.11	0.11
10.000	0.10	0.10	0.10	0.10
10.250	0.09	0.09	0.09	0.09
10.500	0.09	0.09	0.09	0.09
10.750	0.09	0.09	0.08	0.08

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
11.000	0.08	0.08	0.08	0.08	
11.250	0.08	0.08	0.08	0.08	
11.500	0.08	0.07	0.07	0.07	
11.750	0.07	0.07	0.07	0.07	
12.000	0.07	0.07	0.07	0.07	
12.250	0.07	0.07	0.06	0.06	
12.500	0.06	0.06	0.06	0.06	
12.750	0.06	0.06	0.06	0.06	
13.000	0.06	0.06	0.06	0.06	
13.250	0.06	0.05	0.05	0.05	
13.500	0.05	0.05	0.05	0.05	
13.750	0.05	0.05	0.05	0.05	
14.000	0.05	0.05	0.05	0.05	
14.250	0.05	0.05	0.05	0.05	
14.500	0.04	0.04	0.04	0.04	
14.750	0.04	0.04	0.04	0.04	
15.000	0.04	0.04	0.04	0.04	
15.250	0.04	0.04	0.04	0.04	
15.500	0.04	0.04	0.04	0.04	
15.750	0.04	0.04	0.04	0.03	
16.000	0.03	0.03	0.03	0.03	
16.250	0.03	0.03	0.03	0.03	
16.500	0.03	0.03	0.03	0.03	
16.750	0.03	0.03	0.03	0.03	
17.000	0.03	0.03	0.03	0.03	
17.250	0.03	0.03	0.03	0.03	
17.500	0.03	0.03	0.03	0.03	
17.750	0.03	0.03	0.02	0.02	
18.000	0.02	0.02	0.02	0.02	
18.250	0.02	0.02	0.02	0.02	
18.500	0.02	0.02	0.02	0.02	
18.750	0.02	0.02	0.02	0.02	
19.000	0.02	0.02	0.02	0.02	
19.250	0.02	0.02	0.02	0.02	
19.500	0.02	0.02	0.02	0.02	
19.750	0.02	0.02	0.02	0.02	
20.000	0.02	0.02	0.02	0.02	
20.250	0.02	0.02	0.02	0.02	
20.500	0.02	0.02	0.02	0.02	
20.750	0.01	0.01	0.01	0.01	
21.000	0.01	0.01	0.01	0.01	
21.250	0.01	0.01	0.01	0.01	
21.500	0.01	0.01	0.01	0.01	
21.750	0.01	0.01	0.01	0.01	
22.000	0.01	0.01	0.01	0.01	
22.250	0.01	0.01	0.01	0.01	
22.500	0.01	0.01	0.01	0.01	
22.750	0.01	0.01	0.01	0.01	
23.000	0.01	0.01	0.01	0.01	

HYDROGRAPH ORDINATES (ft^3/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)	Flow (ft^3/s)
23.250	0.01	0.01	0.01	0.01
23.500	0.01	0.01	0.01	0.01
23.750	0.01	0.01	0.01	0.01
24.000	0.01	(N/A)	(N/A)	(N/A)

Flow (ft^3/s)
2.25
12.61
14.15
10.80
8.36
6.57
5.23
4.21
3.43
2.83
2.35
1.97
1.67
1.43
1.23
1.06
0.92
0.81
0.71
0.63
0.56
0.50
0.45
0.40
0.36
0.33
0.30
0.27
0.25
0.23
0.21
0.19
0.18
0.17
0.15
0.14
0.13
0.12
0.11
0.10
0.10
0.09
0.09

Subsection: Pond Routed Hydrograph (total out)

Label: POND 2 (OUT)

Return Event: 100 years

Storm Event: MoDOT Curves for O'Fallon - 100 Year

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft³/s)
0.08
0.08
0.08
0.07
0.07
0.07
0.06
0.06
0.06
0.06
0.05
0.05
0.05
0.05
0.04
0.04
0.04
0.04
0.04
0.04
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.03
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.02
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01
0.01

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.050 hours
Time on left represents time for first value in each row.

Flow (ft³/s)
0.01
0.01
0.01
0.01
(N/A)

Summary for Hydrograph Addition at 'POND 2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	AREA 2

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	AREA 2	0.673	0.250	23.26
Flow (In)	POND 2	0.673	0.250	23.26

Summary for Hydrograph Addition at 'POND 2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	AREA 2

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	AREA 2	1.195	0.250	36.14
Flow (In)	POND 2	1.195	0.250	36.14

Subsection: Pond Inflow Summary

Label: POND 2 (IN)

Return Event: 25 years

Storm Event: MoDOT Curves for O'Fallon - 25 Year

Summary for Hydrograph Addition at 'POND 2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	AREA 2

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	AREA 2	1.380	0.250	41.73
Flow (In)	POND 2	1.380	0.250	41.73

Summary for Hydrograph Addition at 'POND 2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	AREA 2

Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	AREA 2	1.875	0.250	52.59
Flow (In)	POND 2	1.875	0.250	52.59

Subsection: C and Area (Pre-Development)

Label: AREA 2

Return Event: 2 years

Storm Event: MoDOT Curves for O'Fallon - 2 Year

C and Area Results (Pre-Development)

Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
	0.400	6.970	(N/A)
Weighted C & Total Area --->	0.400	6.970	2.788

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)
Postdeveloped CA	0.850	8.950
Weighted C & Total Area --->	0.850	8.950

Area (Adjusted) (acres)
(N/A)
7.608

Summary of Rational Method Peak Discharges
--- Pre-Development Conditions ---

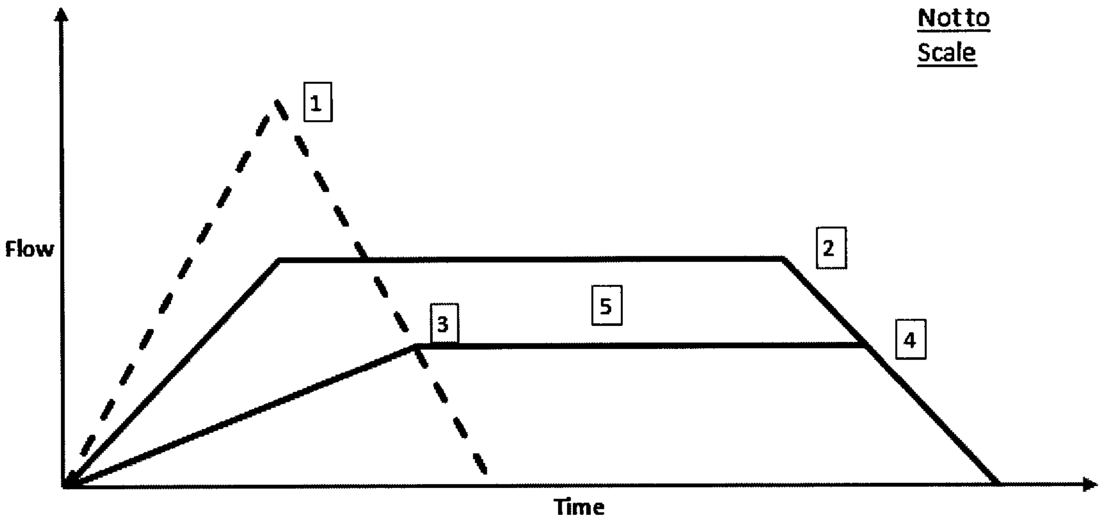
Q = CiA * Unit Conversion; Where Conversion = 43560 / (12 * 3600)

Frequency (years)	C Coefficient	C Adjustment Factor	C Coefficient (Final)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)
2	0.400	1.000	0.400	4.143	6.970	11.65

Subsection: Modified Rational Graph
Label: AREA 2

Return Event: 2 years
Storm Event: MoDOT Curves for O'Fallon - 2 Year

Method Type	Method T
Time of Duration (Modified Rational, Critical)	0.350 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.223	hours	Time of Duration (Modified Rational, Critical)	0.350	hours
Intensity (Modified Rational, Peak)	3.785	in/h	Intensity (Modified Rational, Critical)	3.033	in/h
Flow (Modified Rational, Peak)	29.03	ft³/s	Flow (Modified Rational, Critical)	23.26	ft³/s

[3]	
First Outflow Breakpoint (Modified Rational, Method T)	0.461 hours
Flow (Modified Rational, Allowable)	11.65 ft³/s

[4]			[5]		
Second Outflow Breakpoint (Modified Rational)	0.357	hours	Storage (Modified Rational, Estimated)	0.347	ac-ft
Flow (Modified Rational, Allowable)	11.65	ft³/s			

Modified Rational Method
--- Summary for Single Storm Frequency ---

Q = CiA * Units Conversion; Where Conversion = 43560 / (12 * 3600)

C Coefficient (Weighted)	C Coefficient (Adjusted)	Duration (hours)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft³/s)	Volume (Inflow) (ac-ft)	Volume (Storage) (ac-ft)
0.850	0.850	0.223	3.785	8.950	29.03	0.536	0.321
0.850	0.850	0.250	3.594	8.950	27.57	0.570	0.331
0.850	0.850	0.333	3.113	8.950	23.88	0.658	0.346
						Storage Maximum	
0.850	0.850	0.350	3.033	8.950	23.26	0.673	0.347
0.850	0.850	0.500	2.474	8.950	18.98	0.784	0.326
0.850	0.850	0.667	2.066	8.950	15.85	0.873	0.267
0.850	0.850	0.833	1.781	8.950	13.66	0.941	0.187
0.850	0.850	1.000	1.571	8.950	12.05	0.996	0.094
0.850	0.850	2.000	0.943	8.950	7.23	(N/A)	(N/A)

C and Area Results (Pre-Development)

Soil/Surface Description	C Coefficient	Area (acres)
	0.400	6.970
Weighted C & Total Area --->	0.400	6.970

Area (Adjusted) (acres)
(N/A)
2.788

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)
Postdeveloped CA	0.850	8.950
Weighted C & Total Area --->	0.850	8.950

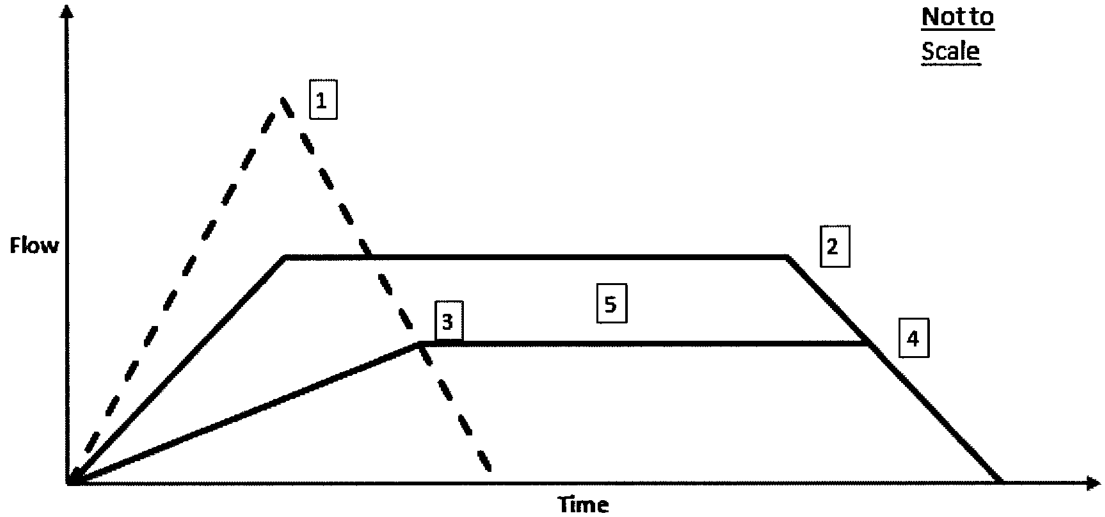
Area (Adjusted) (acres)
(N/A)
7.608

Summary of Rational Method Peak Discharges
--- Pre-Development Conditions ---

Q = CiA * Unit Conversion; Where Conversion = 43560 / (12 * 3600)

Frequency (years)	C Coefficient	C Adjustment Factor	C Coefficient (Final)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)
15	0.400	1.000	0.400	6.704	6.970	18.85

Method Type	Method T
Time of Duration (Modified Rational, Critical)	0.400 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.223	hours	Time of Duration (Modified Rational, Critical)	0.400	hours
Intensity (Modified Rational, Peak)	6.176	in/h	Intensity (Modified Rational, Critical)	4.712	in/h
Flow (Modified Rational, Peak)	47.38	ft³/s	Flow (Modified Rational, Critical)	36.14	ft³/s

[3]	
First Outflow Breakpoint (Modified Rational, Method T)	0.507 hours
Flow (Modified Rational, Allowable)	18.85 ft³/s

[4]			[5]		
Second Outflow Breakpoint (Modified Rational)	0.358	hours	Storage (Modified Rational, Estimated)	0.593	ac-ft
Flow (Modified Rational, Allowable)	18.85	ft³/s			

Modified Rational Method
--- Summary for Single Storm Frequency ---

Q = CiA * Units Conversion; Where Conversion = 43560 / (12 * 3600)

C Coefficient (Weighted)	C Coefficient (Adjusted)	Duration (hours)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)	Volume (Inflow) (ac-ft)	Volume (Storage) (ac-ft)
0.850	0.850	0.223	6.176	8.950	47.38	0.874	0.526
0.850	0.850	0.250	5.891	8.950	45.19	0.934	0.548
0.850	0.850	0.333	5.165	8.950	39.62	1.091	0.586
						Storage Maximum	
0.850	0.850	0.400	4.712	8.950	36.14	1.195	0.593
0.850	0.850	0.500	4.176	8.950	32.03	1.324	0.578
0.850	0.850	0.667	3.529	8.950	27.07	1.492	0.505
0.850	0.850	0.833	3.071	8.950	23.55	1.622	0.394
0.850	0.850	1.000	2.727	8.950	20.92	1.729	0.259
0.850	0.850	2.000	1.680	8.950	12.89	(N/A)	(N/A)

C and Area Results (Pre-Development)

Soil/Surface Description	C Coefficient	Area (acres)
	0.400	6.970
Weighted C & Total Area --->	0.400	6.970

Area (Adjusted) (acres)
(N/A)
2.788

C and Area Results

Soil/Surface Description	C Coefficient	Area (acres)
Postdeveloped CA	0.850	8.950
Weighted C & Total Area --->	0.850	8.950

Area (Adjusted) (acres)
(N/A)
7.608

Summary of Rational Method Peak Discharges
--- Pre-Development Conditions ---

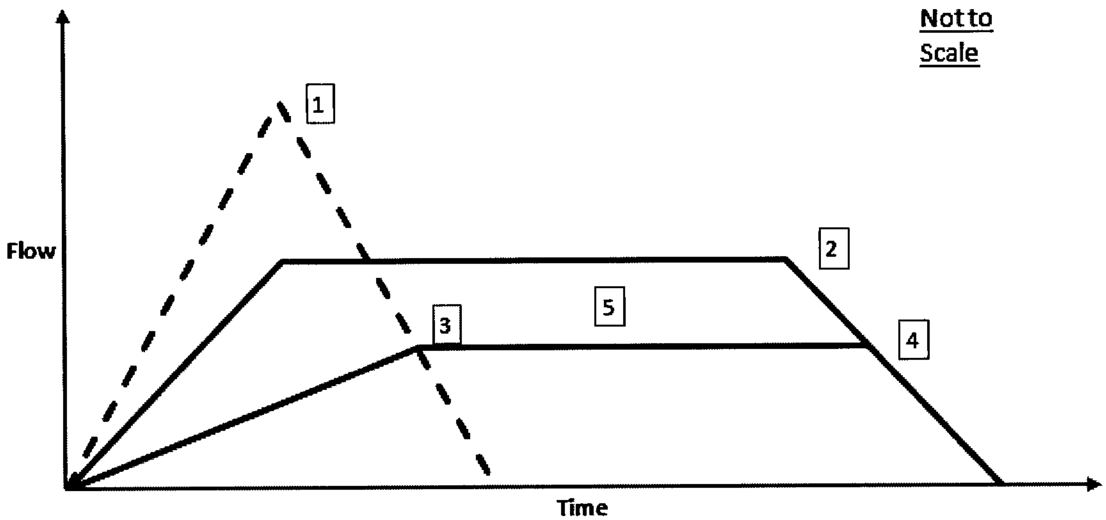
Q = CiA * Unit Conversion; Where Conversion = 43560 / (12 * 3600)

Frequency (years)	C Coefficient	C Adjustment Factor	C Coefficient (Final)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)
25	0.400	1.000	0.400	7.692	6.970	21.62

Subsection: Modified Rational Graph
Label: AREA 2

Return Event: 25 years
Storm Event: MoDOT Curves for O'Fallon - 25 Year

Method Type	Method T
Time of Duration (Modified Rational, Critical)	0.400 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.223	hours	Time of Duration (Modified Rational, Critical)	0.400	hours
Intensity (Modified Rational, Peak)	7.098	in/h	Intensity (Modified Rational, Critical)	5.440	in/h
Flow (Modified Rational, Peak)	54.45	ft³/s	Flow (Modified Rational, Critical)	41.73	ft³/s

[3]	
First Outflow Breakpoint (Modified Rational, Method T)	0.508 hours
Flow (Modified Rational, Allowable)	21.62 ft³/s

[4]			[5]		
Second Outflow Breakpoint (Modified Rational)	0.358	hours	Storage (Modified Rational, Estimated)	0.689	ac-ft
Flow (Modified Rational, Allowable)	21.62	ft³/s			

Modified Rational Method
--- Summary for Single Storm Frequency ---

Q = CiA * Units Conversion; Where Conversion = 43560 / (12 * 3600)

C Coefficient (Weighted)	C Coefficient (Adjusted)	Duration (hours)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)	Volume (Inflow) (ac-ft)	Volume (Storage) (ac-ft)
0.850	0.850	0.223	7.098	8.950	54.45	1.005	0.606
0.850	0.850	0.250	6.776	8.950	51.98	1.074	0.631
0.850	0.850	0.333	5.954	8.950	45.67	1.258	0.678
						Storage Maximum	
0.850	0.850	0.400	5.440	8.950	41.73	1.380	0.689
0.850	0.850	0.500	4.831	8.950	37.06	1.531	0.675
0.850	0.850	0.667	4.094	8.950	31.40	1.730	0.597
0.850	0.850	0.833	3.569	8.950	27.38	1.886	0.475
0.850	0.850	1.000	3.175	8.950	24.36	2.013	0.324
0.850	0.850	2.000	1.970	8.950	15.11	(N/A)	(N/A)

C and Area Results (Pre-Development)

Soil/Surface Description	C Coefficient	Area (acres)
	0.400	6.970
Weighted C & Total Area --->	0.400	6.970

Area (Adjusted) (acres)
(N/A)
2.788

C and Area Results

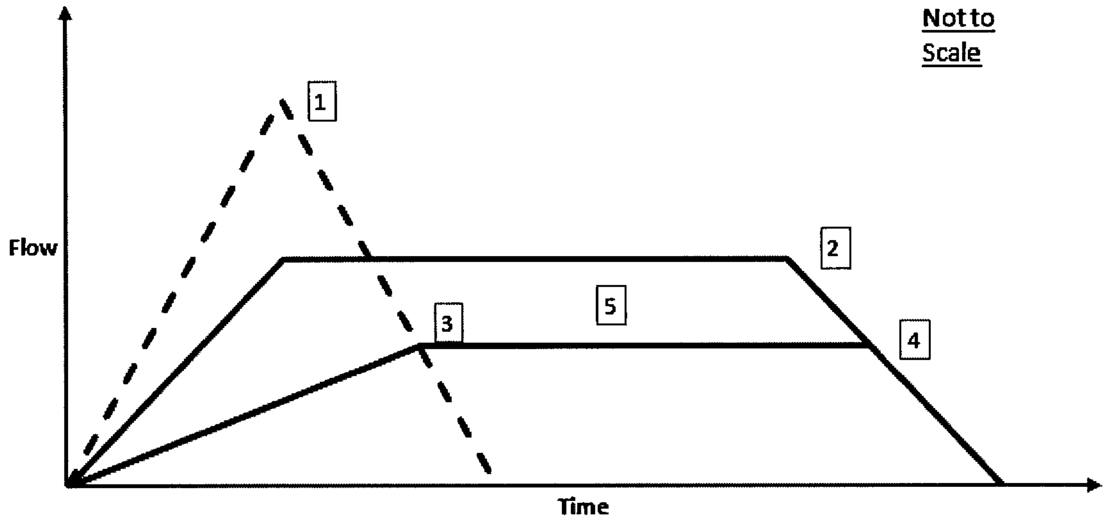
Soil/Surface Description	C Coefficient	Area (acres)	Area (Adjusted) (acres)
Postdeveloped CA	0.850	8.950	(N/A)
Weighted C & Total Area --->	0.850	8.950	7.608

Summary of Rational Method Peak Discharges
--- Pre-Development Conditions ---

Q = CiA * Unit Conversion; Where Conversion = 43560 / (12 * 3600)

Frequency (years)	C Coefficient	C Adjustment Factor	C Coefficient (Final)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)
100	0.400	1.000	0.400	9.976	6.970	28.04

Method Type	Method T
Time of Duration (Modified Rational, Critical)	0.433 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.223	hours	Time of Duration (Modified Rational, Critical)	0.433	hours
Intensity (Modified Rational, Peak)	9.219	in/h	Intensity (Modified Rational, Critical)	6.855	in/h
Flow (Modified Rational, Peak)	70.72	ft³/s	Flow (Modified Rational, Critical)	52.59	ft³/s

[3]	
First Outflow Breakpoint (Modified Rational, Method T)	0.538 hours
Flow (Modified Rational, Allowable)	28.04 ft³/s

[4]			[5]		
Second Outflow Breakpoint (Modified Rational)	0.358	hours	Storage (Modified Rational, Estimated)	0.914	ac-ft
Flow (Modified Rational, Allowable)	28.04	ft³/s			

Modified Rational Method
--- Summary for Single Storm Frequency ---

Q = CiA * Units Conversion; Where Conversion = 43560 / (12 * 3600)

C Coefficient (Weighted)	C Coefficient (Adjusted)	Duration (hours)	Intensity (in/h)	Area (acres)	Flow (Peak) (ft^3/s)	Volume (Inflow) (ac-ft)	Volume (Storage) (ac-ft)
0.850	0.850	0.223	9.219	8.950	70.72	1.305	0.787
0.850	0.850	0.250	8.812	8.950	67.59	1.397	0.822
0.850	0.850	0.333	7.776	8.950	59.65	1.643	0.890
							Storage Maximum
0.850	0.850	0.433	6.855	8.950	52.59	1.883	0.914
0.850	0.850	0.500	6.371	8.950	48.87	2.020	0.907
0.850	0.850	0.667	5.452	8.950	41.82	2.304	0.830
0.850	0.850	0.833	4.796	8.950	36.79	2.534	0.697
0.850	0.850	1.000	4.302	8.950	33.00	2.728	0.527
0.850	0.850	2.000	2.773	8.950	21.27	(N/A)	(N/A)

Index

A

C

APPENDIX F - STORMWATER QUALITY DESIGN WORKSHEET

STORMWATER QUALITY DESIGN WORKSHEET

Project:	Location:	By:	Date:
Ameren COG Solar Project	**O'Fallon, Missouri**	**Steven Beam, P.E.**	**4/8/2014**

Note: All calculations are based on the Georgia Stormwater Management Manual, Volume 2 (Technical Handbook).

Water Quality Volume:

$WQ_V = (1.14 * R_v A)/12$

$R_v = 0.05+0.009(I)$

I = % impervious

A = Drainage Area

Basin	Area (ac)	I* (%)	R_v	WQ_v (ac-ft)
1	14.78	85	0.815	**1.144**
2	8.95	85	0.815	**0.693**

*Type 5 Base has been approximated as 85% impervious.

Bioretention Area:

$A_f = (WQ_v * d_f)/[k*(h_f+d_f)*t_f]$

d_f = filter bed depth (4' min.)

k = coefficient of permeability

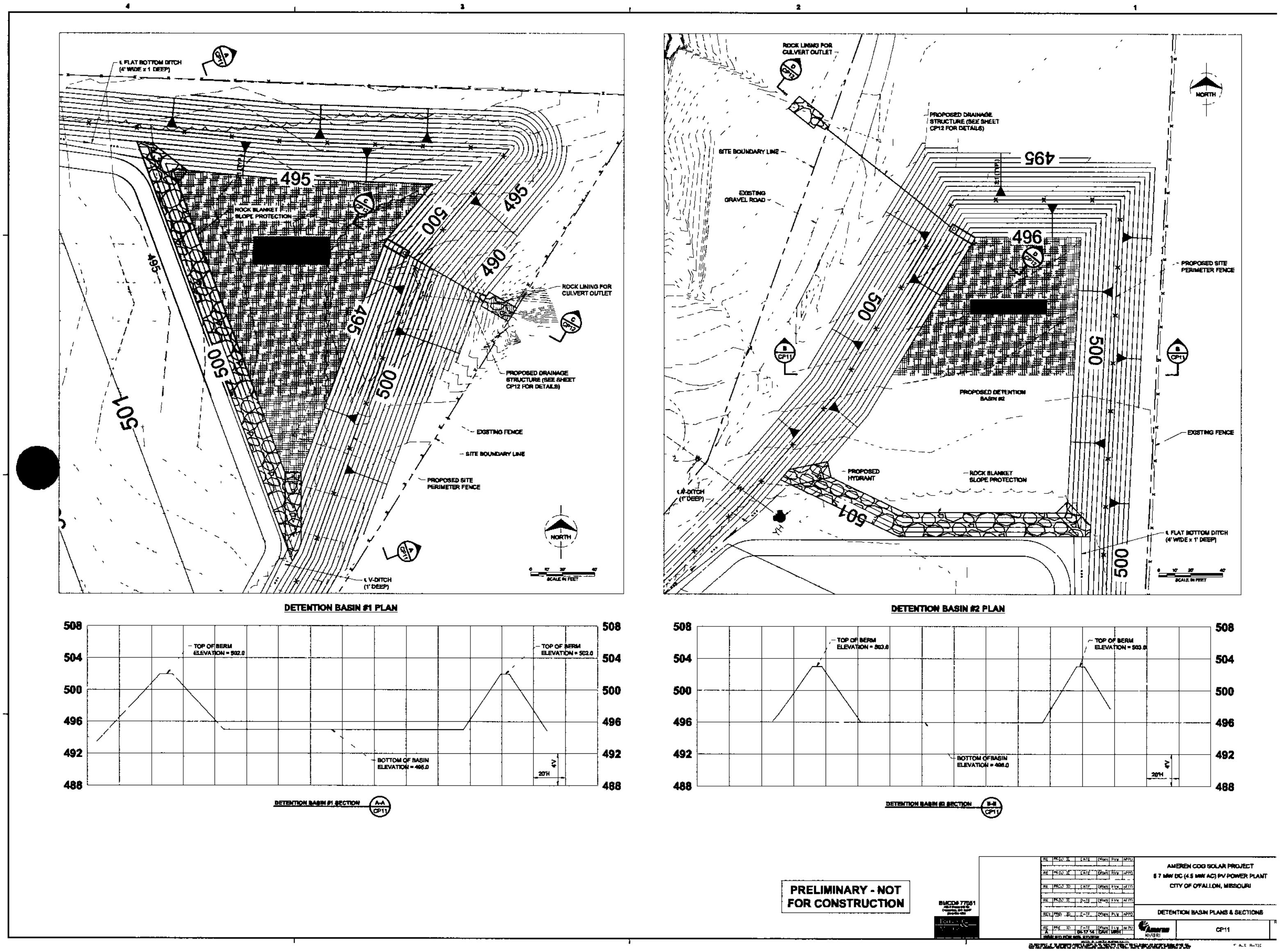
h_f = average head on media

t_f = design media drain time

Basin	d_f (ft)	k (ft/day)	h_f (ft)	t_f (days)	A_f (ac)
1	4	2	0.25	2	**0.269**
2	4	2	0.25	2	**0.163**

THIS AREA NOT REQUIRED FOR CALCULATION SINCE A SINGLE BMP IS USED TO TREAT THE WATER QUALITY VOLUME.

APPENDIX G - DETENTION POND CROSS SECTIONS



℄ FLAT BOTTOM DITCH (4' WIDE x 1' DEEP)
ROCK BLANKET SLOPE PROTECTION
495
500
501
490
ROCK LINING FOR CULVERT OUTLET
PROPOSED DRAINAGE STRUCTURE (SEE SHEET CP12 FOR DETAILS)
EXISTING FENCE
SITE BOUNDARY LINE
PROPOSED SITE PERIMETER FENCE
℄ V-DITCH (1' DEEP)
NORTH
DETENTION BASIN #1 PLAN
SITE BOUNDARY LINE
EXISTING GRAVEL ROAD
496
PROPOSED DETENTION BASIN #2
PROPOSED HYDRANT
ROCK BLANKET SLOPE PROTECTION
DETENTION BASIN #2 PLAN
TOP OF BERM ELEVATION = 502.0
BOTTOM OF BASIN ELEVATION = 495.0
DETENTION BASIN #1 SECTION
A-A CP11
TOP OF BERM ELEVATION = 503.0
BOTTOM OF BASIN ELEVATION = 496.0
DETENTION BASIN #2 SECTION
B-B CP11
508
504
500
496
492
488
4'V
20'H
PRELIMINARY - NOT FOR CONSTRUCTION
BMCD# 77051
AMEREN COG SOLAR PROJECT
5.7 MW DC (4.5 MW AC) PV POWER PLANT
CITY OF O'FALLON, MISSOURI
DETENTION BASIN PLANS & SECTIONS
CP11
04-17-14

APPENDIX H - STORMWATER BASIN OUTLET DETAIL

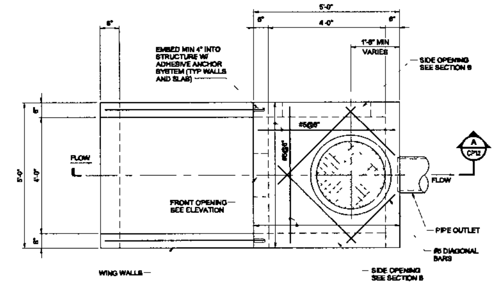
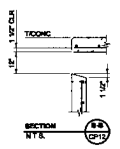
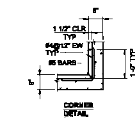


TABLE 1			
	SLOT WIDTH	BOTTOM OF BASIN ELEVATION	TOP OF BASIN ELEVATION
BASIN 1	8"	495.0	502.0
BASIN 2	12"	498.0	503.0

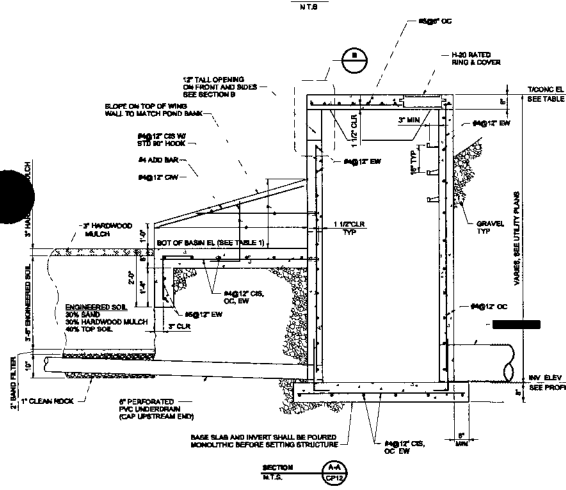


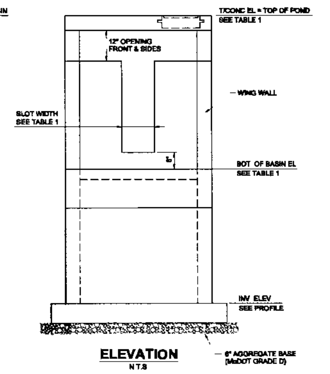


REINFORCING		
BARS	BAR SIZE	SPACING (IN.)
H	4	12
V	4	12
L	5	6
W	5	6

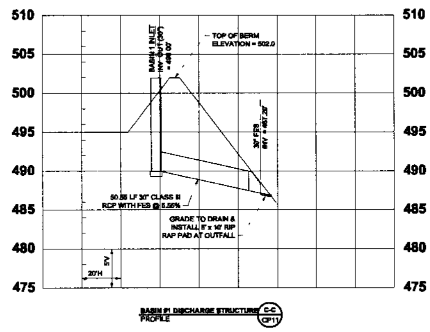
GENERAL NOTES:

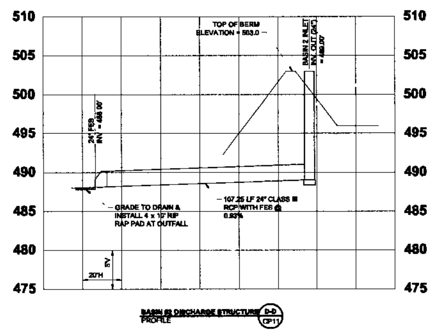
1. LOCATE RING AND COVER OVER OUTLET
2. USE 3/4" CHAMFER STRIP ON ALL EXPOSED CONCRETE CORNERS
3. STEPS REQUIRED AT 16" O.C. WHEN DEPTH FROM TOP OF STRUCTURE TO INVERT EXCEEDS 4'
4. BOXOUTS IN WALLS WILL NOT BE ALLOWED TO PROJECT THROUGH THE CORNERS OF THE STRUCTURE.
5. THE MINIMUM REINFORCING SHALL BE 1 H-BAR OVER A CAST-IN PLACE PIPE AND 2 H-BARS OVER A PRECAST BOXOUT
6. O.R. = OUTSIDE PIPE RADIUS.
7. MANHOLE RING & COVER TO BE H-20 RATED OR APPROVED EQUAL.
8. DISCHARGE STRUCTURE MAY BE CONSTRUCTED CAST-IN-PLACE OR PRECAST AT CONTRACTORS DISCRETION





BASIN DISCHARGE STRUCTURE DETAILS





PRELIMINARY - NOT FOR CONSTRUCTION

BMCD# 77051

AMEREN COG SOLAR PROJECT
5.7 MW DC (4.5 MW AC) PV POWER PLANT
CITY OF O'FALLON, MISSOURI

DETENTION BASIN DETAILS

CP12

REV	PROJ. ID	DATE	DRWN	RVW	APPD
A		04-17-14	CAH	MRH	

ISSUED FOR 60% REVIEW

Burns & McDonnell
SINCE 1898

Burns & McDonnell World Headquarters
9400 Ward Parkway
Kansas City, MO 64114
Phone: 816-333-9400
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100 NORTH MAIN STREET
O'FALLON, MISSOURI 63366
636.240.2000
FACSIMILE 636.978.4144
www.ofallon.mo.us

July 8, 2014

MC Industrial
Patrick Maloney
3117 Big Bend Blvd.
St. Louis, MO 63143

Phone: (314) 486-4019
Fax: (314) 646-4101

Project: O'Fallon Renewable Energy Center
Subject: Site Construction Plan Review
Permit No.: 14-196

Dear Mr. Maloney:
The construction plan for the aforementioned site has been reviewed and is accepted for construction. Following is a general checklist for this site:

- ✓ Contact the Construction Inspection Group at 636.379.7631 to schedule a preconstruction meeting with Construction Inspection and Storm Water, for site inspections and closeout
- ✓ Review erosion control BMP's daily, especially on adjacent streets and properties and monitor possible changes to the erosion control based on schedule of the project
- ✓ Contact Construction Inspector for site and/or infrastructure inspections
- ✓ Upon Completion, contact Inspector for final site inspection

It is the responsibility of the owner/developer to obtain approval from all other departments and outside organizations as required. All City ordinances and standards shall be followed during the construction of the proposed improvements. This approval is for compliance with city standards and ordinance requirements. The City's approval is not a certification of the calculations or plans. The design engineer is responsible for the technical accuracy, project decisions, engineering judgment, and quality of the plans, calculations, and/or report.

This cover letter needs to be distributed to the owner of the property as well as the appropriate site contractor. If you have any questions, please contact me at jgreenlee@ofallon.mo.us or 636.379.5557.

Sincerely,

Jeannie Greenlee

Jeannie Greenlee
Plan Reviewer

Ecc; David Woods – Director of Planning & Development
Shannon Gerard – Assistant Director of Planning & Development
Karl Ebert – Construction Inspector Supervisor

Jay Herigodt – Assistant City Engineer
File

Sent via email: Patrick.maloney@mc-industrial.com
swibbenmeyer@ameren.com

Submittal Log
05/13/14 – Plan Submittal – 1st
05/21/14 – Plan Review Comments
06/02/14 – Plan Submittal – 2nd
06/10/14 – Plan Review Comments
06/12/14 – Plan Submittal – 3rd
06/16/14 – Plan Review Comments
07/08/14 – Escrow Received
07/08/14 – Plan Approved

Engineers Cost Estimate

O'Fallon Renewable Energy Center

Grading Escrow

Unit Description	Unit Price	Unit	Add. Cost	No. of Units		Total
Streets						
				Streets		$0.00
Storm Sewers						
				Storm Sewers		$0.00
Sanitary Sewers						
				Sanitary Sewers		$0.00
O* ***Water***						
				Water		$0.00
Rough Grading						
Erosion Control - Industrial / Commercial.(vegetation)	$1,860.00	# of Acres	$1,550	37		$70,370.00
Grading - Industrial / Commercial.	$1,558.00	# of Acres	$3,720	37		$61,366.00
Siltation Control - Industrial / Commercial (silt fence, silt basins, check dams, etc.)	$774.00	# of Acres	$3,110	37		$31,748.00
Temporary Silt Basin - Construction & Restoration	$5,000.00	each		2		$10,000.00
Construction Entrance / Wash Down Pad / Parking	$25.00	sq yd		1107		$27,675.00
				Rough Grading		$201,159.00
Vegetation						
				Vegetation		$0.00
Sidewalks						
				Sidewalks		$0.00
Street Lights and Name Signs						
				Street Lights and Name Signs		$0.00
Common Ground Improvements						
				Common Ground Improvements		$0.00
Other						
As-Builts - Storm Sewers - Commercial/Industrial/Apts	$150.00	# of Acres	$500	37		$6,050.00
				Other		$6,050.00

O*
O*

Streets		$0.00
Storm Sewers		$0.00
Sanitary Sewers		$0.00
Water		$0.00
Rough Grading		$201,159.00
Vegetation		$0.00
Sidewalks		$0.00
Street Lights and Name Signs		$0.00
Common Ground Improvements		$0.00
Other		$6,050.00
Total		$207,209.00

Company
Address
City, St, Z

Company
Phone: 000.000.0000
Fax: 000.000.0000

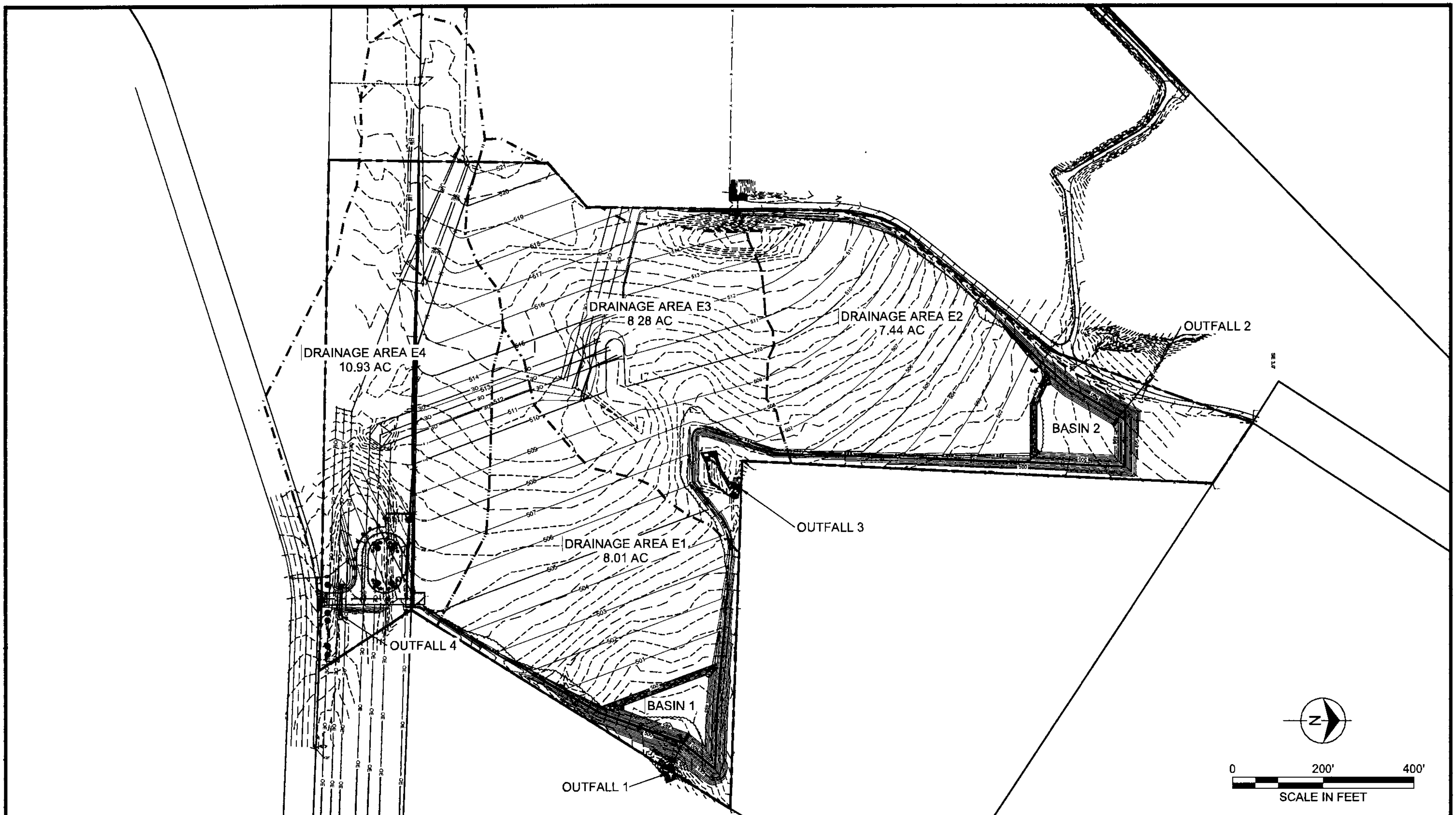
Engineers Cost Estimate
O'Fallon Renewable Energy Center
Ameren Missouri

Site Plan Estimate / Commercial Site Escrow

	Unit Description	Unit Price	Unit	Add Cost	No of Units	Total
	Grading					
O*	Clearing	$3,000 00	# of Acres		3 5	$10,500 00
	Subgrade Preparation	$0 75	sq yd		111500	$83,625 00
	On-Site Excavation/Compacted Fill	$2 00	cu yd		45000	$90,000 00
	Type 5 Aggregate Base (6" thick) - Yard Rock	$4 00	sq yd		110710	$442,840 00
	Geotextile Fabric	$1 50	sq yd		119000	$178,500 00
	Type 2 Rock Ditch Liner (12" thick)	$30 00	cu yd		600	$18,000 00
						$0 00
					Grading	*$823,465.00*
	Re-Vegetation					
	Seeding - common ground	$0 62	sq yd		12100	$7,502 00
						$0 00
					Re-Vegetation	*$7,502 00*
	Siltation Control					
	Silt Fence	$2 00	lin ft		3700	$7,400 00
	Erosion Control Blanket	$2 00	sq yd		8760	$17,520 00
O*	Silt Removal and Restoration (Retention/Detention Basins)	$25,000 00	# of Acres	$10,000	0 8	$30,000 00
						$0 00
					Siltation Control	*$54,920.00*

Grading	$823,465 00
Re-Vegetation	$7,502 00
Siltation Control	$54,920 00
Total	$885,887 00

Don't Use



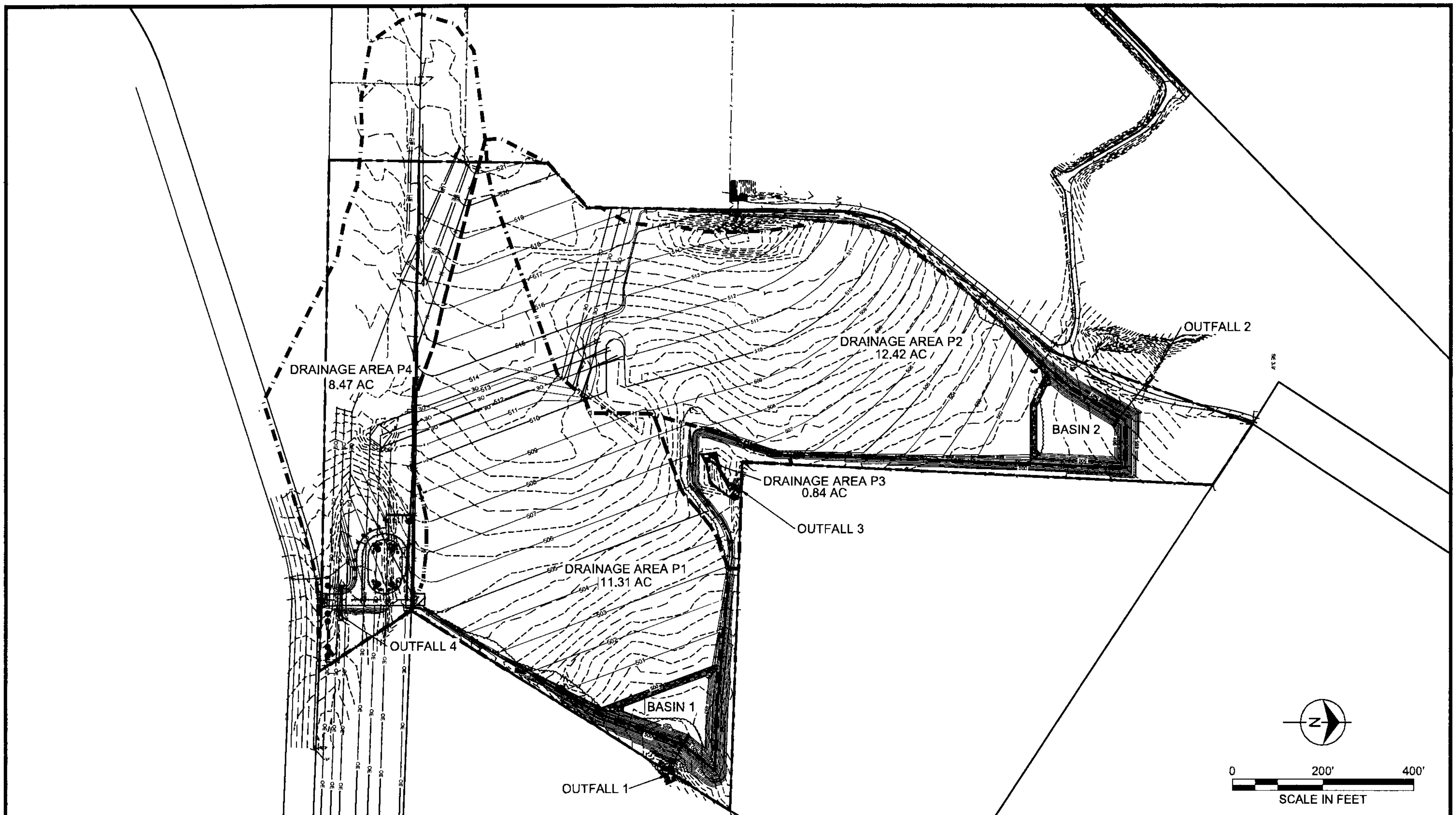
Burns & McDonnell

date	4/11/14
designed	S. BEAM

AMEREN COG SOLAR PROJECT

PRE-DEVELOPMENT
DRAINAGE AREA MAP

project	77051
contract	
dwg. no.	E1
rev.	-



Burns & McDonnell SINCE 1898

date 4/11/14

designed S. BEAM

AMEREN COG SOLAR PROJECT

POST-DEVELOPMENT

DRAINAGE AREA MAP

project 77051

contract

dwg. no E2

rev –

100 NORTH MAIN STREET
O'FALLON, MISSOURI 63366
636.240.2000
FACSIMILE 636.978.4144
www.ofallon.mo.us

June 10, 2014

MC Industrial
Russ Gentemann
Big Bend Blvd.
St. Louis, MO 63143

Phone: (314) 486-4019
Fax: (314) 646-4101

Project: **O'Fallon Renewable Energy Center**
Subject: **Site Construction Plan Review**
Permit No.: **14-196**

Dear Mr. Gentemann:

The City of O'Fallon has reviewed the Site Plans for the above mentioned project. The following items will need to be addressed prior to Site Plan Approval.

1. ~~The maximum plan sheet size is to be 24" x 36".~~
2. ~~A landscaping legend shall be provided identifying the type, mature height and minimum planting size of the proposed trees. Due to the location of the existing overhead electric line, the selected trees near the electric line cannot have a mature height exceeding 15'.~~
3. ~~Provide street tree and tree preservation calculations. Tree preservation calculations were originally provided on the Site Plan.~~
4. A sidewalk is required along the sites street frontage. The City is requesting a fee in lieu of the sidewalk installation. Said fee shall be based on the estimated cost as of the date that escrows are established. **Provide a cost estimate for approval.**
5. ~~The drive aisle cannot function as a two way drive due to the location of the bus parking space. All two way drive aisles must be a minimum of 25 feet in width. Adding more pavement to relocate the bus parking space or reconfiguring the drive aisle for one way traffic are two possible solutions for correcting this issue. Traffic signal markings and signage will need to be installed to notify people of the parking circulation.~~
6. ~~Show the location of the accessible signage on the parking lot detail. The accessible parking sign will need to be revised to comply with Section 400.510 16. c.~~
7. ~~The drainage area maps in the detention report have black block where the text should be. Please send legible replacement pages.~~
8. ~~The basins are to have a minimum of 3 cross sections. These cross section must have information on the plan that will make them easily re-established once the project is completed.~~
9. ~~Revise the list of utilities on sheet CP00 to include only those that would serve this site.~~
10. ~~What will the 2" water line that is proposed be used for? Will that length of 2" line carry enough pressure for the use desired?~~
11. ~~Provide an overlap detail for the silt fence where one section of fence ends and another begins.~~
12. ~~Provide the size of rock and dimensions of the pad for all rip rap pads.~~
13. ~~There is an existing double area inlet shown on the viewing area site plan. We have no record of a pipe to the north side of this inlet.~~
14. ~~The existing double inlet stone is damaged and needs to be called out as to be replaced on the plan.~~
15. ~~Provide an entrance detail specific to the viewing area entrance. Provide detailed dimensions and spot elevations on both the centerline and edge of the intersecting road, a saw cut line, and rounding elevations. Note that pavement removal is to be to the nearest joint. Ensure a 2% maximum cross slope at future crosswalk.~~
16. ~~Provide granular backfill where the roadway crosses the culvert pipes.~~
17. Provide a flared end section detail. (see City standard detail sheets) **Provide depth of upstream & downstream toe walls.**
18. ~~Revise the accessible parking sign to be 5ft to the bottom of the sign from the finished grade.~~
19. ~~Provide a vertical concrete curb and gutter detail to match the existing pavement on TR Hughes Blvd.~~

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Sincerely

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06/02/1
06/10/1

Engineers Cost Estimate
O'Fallon Renewable Energy Center

Grading Escrow

Unit Description	Unit Price	Unit	Add Cost	No. of Units		Total
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Sanitary Sewers						
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				Water		*$0.00*
Rough Grading						
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