HOWELL ENGINEERING
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June 15, 2023

Mila Carter, Assistant Township Manager
Westtown Township
1039 Wilmington Pike
West Chester, PA 19382

Re: Stokes Estate Conditional Use
Westtown Township, Chester County

Dear Mila:

On behalf of Fox Clearing, LLC, DL Howell and Associates, Inc. is resubmitting for your review the enclosed Conditional Use application for the above referenced project. The revised plans have been revised in response to the Township Consultant review letters.

Our resubmission consists of the following:

- Revised Conditional Use Plans (38 sheets) – 16 Copies
- Revised Conservation Plans (2 sheets) – 16 Copies
- Revised Preliminary Stormwater Management Report– 1 Copy
- Response letter to review from CEG – 16 copies
- Response letter to review from AFC – 16 copies
- Response letter to review from Zoning/Planning – 16 copies
- Response letter to review from Fire Marshal – 16 copies
- PHMC Clearances and Historic correspondence/analysis – 16 copies
- Photo Exhibit (views from public roads) – 16 Copies
- Enterprise Easement Agreement – 16 copies
- Digital files will be emailed to your attention for the Township's Records

We appreciate your time and consideration. Should you have any questions or require any additional information, please let me know.

Sincerely,
D.L. HOWELL & ASSOCIATES, INC.

Dave Gibbons, P.E.
Senior Engineer

1250 Wrights Lane, West Chester, PA 19380 | PHONE 610 918 9002 | FAX 610 918 9003

HOWELL ENGINEERING
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June 15, 2023

Mr. Jon Altshul, Township Manager
Westtown Township
1039 Wilmington Pike
West Chester, PA 19382

RE: Stokes Estate Flexible Residential Development – 927 Shiloh Road, 1007 Shiloh Road, 1011 Shiloh Road, and 1013 Shiloh Road
Conditional Use Application

Dear Mr. Altshul:

This letter is in response to Ms. Carter's May 19, 2023 completeness review of the above-referenced conditional use application. Please note that your May 19, 2023 completeness review was beyond the scope of administrative completeness. Many of the comments are substantive in nature.

Notwithstanding, listed below are our responses to the concerns identified in their review of the plans. Also, enclosed for your review are copies of the updated plans. Where applicable, Howell Engineering has addressed each of these comments indicating what action has been taken to resolve the issues. **Any comments that are statements and do not require any action have been omitted in the list of responses.**

1. Applicant shall address all below-mentioned items as they relate to providing sufficient information to determine compliance with this requirement.

   Howell Response: All below mentioned comments have been addressed.

2. Applicant shall provide a narrative and/or plan notes addressing this requirement.

   Howell Response: Section 170-2009.B.(6) is not a requirement but rather only requires "strong consideration" to incorporating LEED certified building designs, which is beyond the scope of conditional use under Pennsylvania law.

Conservation Design (§170-1617)

3. Applicant is recommended to limit legend items to those depicted on the plans for clarity purposes.

   Howell Response: Per the request, the legend has been stripped down to be more representative of what is shown on the plans.

4. Conservation Design Plan is lacking such detail.

Howell Response: Wetlands have been delineated and area shown accurately on the Conservation Plans and the Conditional Use Plans. A note is already provided on the Conditional Use Plans and has been copied to the Conservation Plans as requested.

5. Conservation Design Plan is lacking such detail.

   Howell Response: Floodplain limits are shown accurately on the Conservation Plans and the Conditional Use Plans pursuant to official FEMA mapping. A note is already provided on the Conditional Use Plans, and has been copied to the Conservation Plans as requested.

6. Conservation Design Plan does not depict clear boundaries of woodlands and tree lines, location of large specimen trees over 18 inches in trunk diameter, and scenic views from inside the site and existing streets and trails. The precise delineation of primary and secondary conservation areas is important to determine whether the application meets the requirements of §170-1617.C(2) pertaining to limitations on intrusion of land development activities and associated land disturbance into such areas. Applicant shall incorporate details of above-noted secondary conservation areas into the Conservation Design Plan map and calculations table and adjust relevant plan sheets appropriately.

   Howell Response: All applicable secondary conservation areas including woodland lines, tree lines and specific large surveyed trees are now labeled on the Existing Resources and Site Analysis Map. As determined by the Chester County Court, the scenic views preservation requirement under the Ordinance is unenforceable. There is a calculation provided verifying less than 50% disturbance to the secondary conservation areas. Any disturbance of primary conservation areas is pursuant to permitted and development related disturbances per the Ordinance.

7. Conditional Use Plan set includes locations and descriptions of existing buildings, but does not provide a description of any historic architectural significance for historic resources located at 1013 Shiloh Road and 927 Shiloh Road, which have been identified and mapped by the Township's Historical Commission as sites of local historic value. Applicant shall provide such descriptions in the written narrative and/or plan notes.

   Howell Response: Letters from the PHMC responding to the Applicant's Historic Consultant, Bob Wise, is included in the resubmission. The letters also includes Mr. Wise's reports on the Miles House and Briner House and the commitment letter for the Stokes dwelling.

8. Conservation Design Plan displays several pockets of open space within the tract area that are not fully interconnected and limited by proposed building lots and roadways. Applicant shall revise the plan to ensure open space interconnectivity.

   Howell Response: The internal proposed development sidewalks and trails provide interconnectivity between the open space areas throughout the community.

9. Conservation Design Plan shall include calculations verifying that proposed land development activity and associated land disturbance is not within more than 50% of secondary conservation areas. Applicant shall provide such calculations, which will also address comment #6.

Howell Response: A full chart tabulating primary and secondary conservation areas and their associated disturbance amount is now provided on the Conservation Plan sheet 02 of 02. It confirms compliance with this section.

10. Applicant shall include such analysis to show compliance with the requirement and to supplement the provided plan set.

Howell Response: The Conservation Plan provides this information in written and graphic format. No additional narrative is required.

Density Standards (§170-904)

11. Applicant shall provide a written narrative detailing justification for minimum required open space and bonus open space calculations and supplement that with a site plan showing all primary and secondary conservation areas, designated common open space areas and recreational areas.

Howell Response: The Conditional Use Plans provided provide an Open Space Plan and associated tables/calculations demonstrating compliance with the bonus density standards. The ordinance section does not require a written narrative, as it states "the applicant shall submit plan(s), narrative, and graphic materials as necessary to adequately demonstrate compliance." The Plans sufficiently demonstrate compliance.

12. Conditional Use Plan set provides a table with calculations (sheet 6) for required minimum common open space and bonus open space with specific exclusions, however, the table does not address proposed impervious surface for trails and potential impervious surface associated with future recreational areas.

Howell Response: There are currently no proposed impervious surfaces proposed with the active recreation. Due to the location of the trails within and adjacent to natural sensitive areas, ie wetlands, woodlands, slopes, etc., naturalized trails are being proposed.

13. Applicant shall provide written narrative and/or graphic analysis addressing this requirement.

Howell Response: Section 170-904.A(3)(b) requiring protection of scenic views and historical landscapes is not enforceable since it is not related to any objective criteria. In addition, the Chester County Court already determined this provision to be unenforceable.

14. Conditional Use Site Plan set does not show calculations for common open space right-of-ways of public streets. Several building lots will have small yard areas preventing property owners to construct additional improvements, such as patios, decks and sheds, which will unlikely meet the existing setback requirements.

Howell Response: A calculation is provided on Sheet C01.1, providing for a net residential density of 3.3 dwelling units per acre which does not exceed the maximum allowed of 4.0 DU/Acre.

15. Landscaping provides a visual buffer between the higher-density housing of the proposed development and neighboring areas of lower-density residential housing. Proposed lots 1-8 depicted on the Conditional Use Plan set are encumbered by the 50 foot tract boundary setback, which would

greatly limit the yard use and future improvements. Applicant shall reconsider the general layout of these lots to allow for greater setback to accommodate future improvements.

Howell Response: The Applicant is satisfied with the available lot areas and the ability to construct decks and patios.

Design Standards (§170-905)

16. Applicant shall indicate the historic resources and their classifications as designated by the Historical Commission on the Westtown Township Historic Resources Map, scenic views as per §170-1617.C(1)(c) and all lands visible from any adjacent public road on the site analysis plan.

Howell Response: A photo exhibit is included in the resubmission documenting lands visible from adjacent public roads. Additionally, a general note is provided on the cover sheet that notes the site is classified as "2 – of Local historic value" on the township historic resources map. As stated above, correspondence from the PHMC and the Applicant's Historic Consultant is provide in the resubmission.

17. Applicant shall provide a written narrative and/or plan notes to indicate compliance with the requirement.

Howell Response: General Note 29 on sheet C01.1 now states, "the limits of disturbance shall be staked in the field prior to clearing of any earth disturbance. Any change or encroachment onto these areas without conservation district review and approval may require the contractor to cease disturbance and obtain an earth disturbance permit. Install tree protection fencing around perimeter of trees where limit of disturbance abuts woodlands.

Development Impact Study (§170-906)

18. Township staff recommends such impact study to be prepared and submitted to the Township by the applicant to demonstrate the extent of impacts of the proposed flexible development on elements as described above.

Howell Response: The Application already includes all information related to a development impact study including: traffic impact (Traffic Impact Study), sewer/water utility impact (Will Serve Letters) and existing natural resources impact (Conservation Design Plan)

Open Space Standards (§170-907)

19. Referenced table is located on drawing no. C01.6 (sheet 6).

Howell Response: This notation typographical error has been corrected.

20. Applicant shall ensure consistency between the items in the table and map labels.

Howell Response: Open Space #4 is now properly labeled. Furthermore, the Open Space Parcel is now also noted as Lot 27 in the table, which is the large lot associated with the existing historic dwelling.

21. Applicant shall provide a written narrative addressing this requirement.

    Howell Response: The "to the satisfaction of the Board" standard under Section 907.A.(1) is subjective, and therefore, not applicable. Conditional use plans are not required to be consistent with comprehensive plans under Pennsylvania law.

22. Conditional Use Plan Set (sheet 6) displays an area totaling 6.61 acres as suitable for active recreation, however, no details are provided on how this area will be used, maintained and/or accessed for recreational purposes. Applicant shall provide additional details on the plan set and/or in a written narrative.

    Howell Response: Section 170-907.A.(2) does not require the Applicant to design the active recreational areas. Rather, the Applicant just has to set aside an area that may be suitable. The area set aside is suitable for active recreation.

23. Preliminary Stormwater Management Report includes the following permanent BMPs proposed for the developed site area: vegetated swales, infiltration basins/beds, forebays and level spreaders. Applicant shall verify with the Township engineer whether these BMPs shall be excluded from the minimum required open space calculations.

    Howell Response: Section 170-907.A.(5).(e) permits areas used for subsurface infiltration of stormwater, including open areas or settling ponds accessory to infiltration, to be included in open space. The infiltration basin/beds, and associated forebays and level spreaders are either used for subsurface infiltration or are accessory to infiltration. Vegetated swales within the open space areas have been excluded from the qualifying open space calculation.

24. Conditional Use Plan does not provide detailed information to show compliance with this requirement. Applicant shall note appropriate access details and sufficient perimeter parking for common open space areas on the plan set. If appropriate, table with calculations for common open space areas shall be revised to reflect any changes.

    Howell Response: Section 170-907.A.(7) only requires perimeter parking "when necessary". As the proposed open space will only be used by the proposed residential community and is connected by sidewalks and trails, no perimeter parking is needed.

25. Conditional Use Plan set (sheet 36) notes that historic home open space parcel is included as part of the required minimum common open space; however, the parcel includes a house.

    Howell Response: As the Applicant is not seeking any bonus density with the historic preservation, the lot area has been reduced and not included in the open space, therefore this comment is no longer applicable.

26. Conditional Use Plan set does not address the retaining of natural cover and/or wooded areas nor it provides any details on the maintenance costs. Applicant shall provide additional information on the plan notes and address the retention of specific areas.

    Howell Response: The open space plan labels the areas of open space which remain outside of infiltrating SWM areas, to either be "natural" meadow or wooded area. Additionally, a landscape

plan is provided which has been designed to meet township landscape requirements, therefore minimizing maintenance costs as much as possible.

Historic Preservation (§170-2400)

27. We highly encourage the applicant to grant permission to the Historical Commission to photograph and document all historic structures existing on the lot prior to demolition.

    Howell Response: The applicant does not have any objection to this request. It can be further discussed during the conditional use and land development process with the Board.

I trust that all of their comments have been addressed adequately. Please do not hesitate to contact me at 610-918-9002 with any questions.

Sincerely,
D.L. HOWELL & ASSOCIATES, INC.

Denny L. Howell, PE
President

David W. Gibbons, PE
Senior Engineer

HOWELL
ENGINEERING
Local Knowhow. Engineered.

June 15, 2023

Mr. Jon Altshul, Township Manager
Westtown Township
1039 Wilmington Pike
West Chester, PA 19382

RE: Stokes Estate (Fox Clearing, LLC)
Conditional Use – Fire/Emergency Services Review
Westtown Township, Chester County

Dear Mr. Altshul:

This letter is in response to the May 26, 2023 Fire Marshal review of the above referenced conditional use application.

Listed below are our responses to the concerns identified in their review of the conditional use application. Also, enclosed for your review are copies of the updated plans. Where applicable, Howell Engineering has addressed each of these comments indicating what action has been taken to resolve the issues. **Any comments that are statements and do not require any action have been omitted in the list of responses.**

Access:
Howell Response: If the Applicant is successful in its pending litigation regarding an easement to Shiloh Hill Road, the Applicant will agree to provide an emergency only access.

Fire Hydrants:
Howell Response: Fire hydrants will be provided on the plan during land development. The applicant is not opposed to providing hydrants as mapped by the Fire Marshal.

Address:
Howell Response: The applicant is not opposed to providing signage and addresses as noted by the Fire Marshal, subject to review and approval of the County Emergency Services, and the USPS.

I trust that all comments have been addressed adequately. Please do not hesitate to contact me at 610-918-9002 with any questions.

Sincerely,
D.L. HOWELL & ASSOCIATES, INC.

Denny L. Howell, PE
President

David W. Gibbons, PE
Senior Engineer

HOWELL ENGINEERING
Local Knowhow. Engineered.

June 15, 2023

Mr. Jon Altshul, Township Manager
Westtown Township
1039 Wilmington Pike
West Chester, PA 19382

RE: Stokes Estate
Conditional Use Review
Westtown Township
WTT-21-228

Dear Mr. Altshul:

This letter is in response to the June 17, 2023 Cedarville Engineering Group, LLC (CEG) review of the above referenced Plans by D.L. Howell and Associates, Inc.

Listed below are our responses to the concerns identified in their review of the plans. Also, enclosed for your review are copies of the updated plans. Where applicable, D. L. Howell & Associates, Inc. has addressed each of these comments indicating what action has been taken to resolve the issues. **Any comments that are statements and do not require any action have been omitted in the list of responses.**

Zoning Comments

1. A copy of the Title Report or applicable documentation shall be provided to clarify ownership rights (fee simple, easement) associated with the Buckeye Laurel Pipeline and Enterprise rights-of-way which cross the tract.

   Howell Response: A copy of the Enterprise pipeline easement is enclosed in this resubmission. However, the Township has no authority to interpret, apply or enforce private easement agreements, especially under the guise of a zoning ordinance.

2. The following shall be addressed:
   - Prohibitive slopes exist directly to the north of Lot 22. A retaining wall is being proposed within Lot 22 and the adjacent open space to avoid Prohibitive Slope encroachment. The configuration of Lot 22 shall be revised so that the retaining wall is located completely within the Open Space, with ownership and maintenance being the responsibility of the Homeowners Association.
     Howell Response: While our office disagrees that this is needed, the lot line for Lot 22 has been adjusted.

   - A conveyance swale is proposed to the north of Lots 73-75, terminating at a proposed inlet and storm sewer located between Lots 72 and 73. Immediately downslope of this inlet, and upslope

of a proposed swale to the north of Lots 70-72, an area of Prohibitive Slopes exists where no conveyance swale is proposed. The applicant shall address how conveyance of upslope flow to the rear of Lot 72 will be conveyed away from the Lot, without the need for encroaching on the Prohibitive Steep Slopes.

Howell Response: Grading has been updated to convey water into the inlet without encroaching on the prohibitive steep slopes.

3. The applicant shall provide supporting information for the following lots, in tabular form, to demonstrate compliance with the above Ordinance criteria:
   Lot 16, Lot 22, Lot 27, Lot 65, Lot 71, Lot 72, Lot 73, Lot 74

   Howell Response: Section 170-402.D.(3)(f) applies to existing natural resources, therefore it has been applied only to the overall lot. It does not apply to the post construction subdivision or the proposed individual lots. Calculations are provided on the cover sheet showing that the amount of precautionary slopes do not exceed 25% of the overall lot area.

4. The Zoning Officer shall provide confirmation that the transmission lines contained within the Buckeye/Laurel and Enterprise rights-of-way do not contain surface land uses.

   Howell Response: Pursuant to our field survey, there are no compressor stations, pumping stations, regulator stations, launcher/receive or other surface pipeline appurtenances located on this property.

5. Acquisition of the referenced permits is appropriate at the time of Land Development application.

   Howell Response: Acknowledged. This will be handled during land development.

6. A Plan shall be provided, showing the proposed lot and improvements layout, with agriculturally suited soils (GdB, GdC) shaded.

   Howell Response: The soils limits, including any agriculturally suited soils, are shown on both the existing conditions plan and grading utility plan. The soils listing on the plan notes any soils that are agriculturally suited. Please note that single family residential development is a use permitted in this zoning district and on this property, and it is not possible to develop this use on this property without placing structures and paving within areas of agriculturally suited soils. Single family home lots are allowed by zoning and are not considered an agriculture use.

7. The Open Space Plan (sheet 6) shall be revised to clearly show improvements associated with active recreation areas, along with maintenance requirements associated with proposed passive open space areas.

   Howell Response: An area suitable for active recreation is provided on the open space plan. Detailed improvements for the active recreation areas are not required under the Ordinance. Maintenance notes for the open space areas have been added to the plan.

8. The following shall be addressed:
   - A sixty (60) foot wide Buckeye/Laurel Pipeline right-of-way and a fifty (50) foot wide Enterprise right-of-way encompass portions of Open Space Open Space Areas B1, B2, and B3. The following shall be provided:

- The Township Solicitor shall determine whether the ownership and maintenance responsibilities associated with these rights-of-way can be transferred to the Homeowners Association, and therefore whether these areas can be applied to qualifying open space.
- If the Township determines that these areas can be applied to Open Space, correspondence shall be provided by Buckeye/Laurel Pipeline and Enterprise as to any requirements associated with their right-of-way, acknowledgement as to the proposed use of the Open Space, and acknowledgement that maintenance will be the responsibility of the Homeowners Association.

  Howell Response: As the property owner, the Applicant is entitled to use the land above the pipelines to the extent such use does not interfere with the pipeline use. As such, the Applicant has the right to include the land as passive Open Space. The Township Zoning Ordinance does not have any applicable objective provisions to the contrary and the Township may not just fabricate such a provision through ad hoc interpretations.

- Per the Stormwater Management Calculations, the above ground portion of the stormwater management facilities shall be used to manage and comply with the Stormwater Peak Rate Control Requirements, Section 144-308 of the Township's Stormwater Management Ordinance. The above ground portion of these facilities shall therefore not be considered accessory to the infiltration facility, unless the infiltration facility is designed to accommodate the appropriate volume required to comply with the referenced Ordinance section.

  Howell Response: The above ground portion of the stormwater facilities are accessory to the infiltration as they are necessary to detain stormwater prior to infiltration over the required period of time. Without the above ground portion of the stormwater facilities, the required amount of infiltration could not occur as the stormwater would sheet flow off of the property.

- The following information shall be shown on the Open Space Plan to demonstrate compliance (1/2 acre or more and minimum 75-foot width) with the above referenced criteria, in the following areas:
  - The area of the portion of Open Space B2 adjacent to Roads A and C, and Lots 32 and 33, to the north of the cross hatched area behind Lots 28-32.
    Howell Response: This area has been dimensioned to show 75' in width. The area referenced in the comment is clearly contiguous to acres and acres of open space, therefore complying with Section 170-907.A(7)(a).
  - The width of the portion of Open Space B2, to the east of Lot 34, south of the cross hatched area and north of the area shaded as "Area Suitable for Active Recreation".
    Howell Response: Our office is unaware of an area east of Lot 34 that matches up with what is described in the comment?
  - The widths of Open Space areas B4 and B6, adjacent to Shiloh Road, shall be dimensioned to demonstrate compliance.
    Howell Response: These areas have been dimensioned on the plan [75'].
- The portion of "Required Minimum Common Open Space" located along the north side of Road B shall be excluded from qualifying open space.

Howell Response: Our office is unaware of Open Space located on the north side of Road B. If this should have referenced Road D, this area has been correctly labeled as Open Space 4 and is ½ acre in size, and can be counted towards qualifying open space.

9. Bonus density calculations shall be revised to exclude the applicable areas as referenced in comment #8 above.

   Howell Response: There is no need to adjust the bonus density calculations per the comments above.

10. The following shall be addressed:
    - The "Change in Runoff Volume for 2-Yr Storm Event" worksheet on page 9 of 270 within the report shall be revised as follows:
      - To include all areas of woods as woodland.
      - To revise the proposed meadow condition to lawn.

    Howell Response: Areas of woodland have been incorporated into the spreadsheet. The meadow condition has been changed to lawn.

    - The following shall be provided to support the preliminary stormwater volume controls:
      - BMP details for each proposed BMP with outlet structures.

        Howell Response: Pursuant to Section § 170-2009B(3)(d), a Conditional Use application shall include sufficient information, e.g., preliminary site grading and road profiles, preliminary stormwater management analysis, etc., to preliminarily determine compliance with the Township natural feature, site analysis, conservation design process and density requirements. Detailed grading plans, stormwater calculations, profiles and similar engineering details are not required to be submitted until a preliminary or final plan application is made under Chap. 149, Subdivision and Land Development. The specific details are beyond the scope of the Conditional Use Application requirements and will be provided during Subdivision and Land development. The hydrograph report in the preliminary SWM report provide sufficient stage storage and outlet structure information to support the preliminary volume controls.

      - Basin 2 Infiltration Volume Calculations (17/270) within the report shall be verified and revised as it notes only 3,956 CF of volume while the Structural BMP Volume Credits for DP2 (13/270) notes 33,072 CF of volume.

        Howell Response: The typographical error on the Basin 2 Volume Calculation worksheet has been corrected to match the 33,072 CF.

      - Basin 4 Infiltration Volume Calculations (19/270) within the report shall be verified and revised to have a permanent storage volume consistent with the lowest outflow elevation of the Pond Report for Basin 4 (68/270).

        Howell Response: The report calculations have been revised to be consistent.

11. The plans shall clearly indicate if the applicant intends to phase the development. If phasing is to be proposed, the applicable phasing shall be shown on the plan.

    Howell Response: There is no intent to phase the development at this time.

12. The Township Planning Commission and Board of Supervisors shall evaluate the need for sidewalks on both sides of Roads A, C, and D. Based upon the density and lot locations proposed, CEG recommends providing sidewalks on both sides of these roads.

Howell Response: No response needed.

13. The distance between the proposed dwelling on Lot 14 and the proposed pump station shall be dimensioned to demonstrate compliance with the above referenced Ordinance section.

    Howell Response: Please note there is no intention to have a Pump Station building (structure) adjacent to Lot 14. The pump station is planned to consist of a wet well, valve vault, backup generator, and an electric enclosure with control panel, therefore we don't believe this comment to be applicable.

14. The soils legend on sheet 7 shall be revised to indicate which soils have a seasonally high water table.

    Howell Response: This has been added as requested.

15. Conveyance swales and storm sewer not located within right-of-way to be dedicated to Westtown Township will be the responsibility of the Homeowners Association. A minimum, twenty (20) foot wide easement or ten (10) feet to a single side shall be provided for the following conveyance swales:
    - Conveyance swale in the rear yards of Lots 1-12, conveying flow to Basin *1.
    - Conveyance swale in the rear of Lots 15-22, conveying flow to the inlet located on the property line of Lot 21 and 22.
    - Storm sewer run from the inlet on the Lot 21/22 property line to the right-of-way of Road A.
    - Storm sewer run along the Lot 13/14 property line.
    - Conveyance swale in the rear yards of Lots 23-27, conveying flow to Basin *2.
    - Storm sewer within the rear yard of Lots 23-26.
    - Conveyance swale in the rear yards of Lots 28-33.
    - Storm sewer run within Lot 58.
    - Storm sewer run along the Lot 37/38 property line.
    - Conveyance swale within the rear yard of Lots 58-64, conveying flow to the inlet within Lot 58.
    - Conveyance swale within the rear yard of Lots 53-57.
    - Conveyance swale within the rear yard of Lots 40-52, conveying flow to Basin *3.
    - Storm sewer run within the rear yard of Lots 72-74 (lines shown, shall be labeled).
    - Conveyance swale within the rear of Lots 68-76.
    - Storm sewer run along the Lot 68/69 property line (line shown, shall be labeled).
    - Storm sewer run along the Lot 68 property line abutting Open Space.

    The following shall be addressed:
    - Lot areas shall be revised to exclude the above referenced easements.
    - The locations of the proposed dwellings shall be modified as applicable to not encroach within the referenced easements.

    Howell Response: This comment is not applicable to Conditional Use. Also, it is our opinion that since the definition of Lot area states, "For purposes of compliance with minimum lot area requirements, the following shall be excluded: C. Any area within a permanent drainage easement", this would not applicable to this subdivision since there are <u>no</u> minimum lot area requirements for single family detached dwellings required under the Flexible Development Procedure.

16. The following shall be addressed:
    - The length of the cul-de-sac, from the Road A intersection with Road B, to the end of the northern portion of Road C, exceeds the maximum length required per the above referenced Ordinance. The length of the northern portion of Road C shall be decreased to comply with this requirement.

- If it is the applicant's intent to provide a connection from the proposed northern cul-de-sac bulb of Road C to existing Shiloh Hill Road, the applicant shall provide supporting information demonstrating that the Shiloh Hill Road right-of-way currently extends to the northern tract boundary of the subject tract.
- If the above can be adequately demonstrated, the applicant will be required to complete the roadway extension between Road C and Shiloh Road. Supporting information shall be provided to demonstrate that this connection complies with the horizontal and vertical geometry criteria set forth in Sections 149-905 and 149-906 of the Subdivision and Land Development Ordinance.

Howell Response: Section 170-201 defines "cul-de-sac" as "a local street intersecting another street at one end and terminated at the other end by a permanent vehicular turnaround". Road C intersects Road A at one end and terminates with a permanent vehicular turnaround at two ends, thereby creating two cul-de-sacs having a length of 1,210 linear feet and the other having a length of 411 linear feet. However, even if measured as noted in the comment from the intersection of Road A & B, the length from the radius of the northern cul-de-sac of Road C to the edge of curbline to the closest street, our office measures the length as 1,487 LF, therefore still compliant.

17. The following shall be addressed:
    - Dimensions shall be provided on the "Typical Single-Family Detached Lot" to demonstrate that the minimum parking stall dimensions set forth in Section 170-172 can be accommodated without a vehicle encroaching into the roadway right-of-way.
    - The applicant shall address whether on-street parking is to be proposed and the limitation associated with on-street parking.

    Howell Response: The garages have been situated generally one (1) foot behind the setback to allow an 18' foot deep parking space in the driveway. This is now dimensioned on the typical single family layout. With regards to on-street parking, each dwelling will have four (4) parking spaces, two (2) in the garage and two in the driveway, which exceeds the required three (3) spaces per dwelling unit. With a 24' wide cartway, typically parking would be prohibited on-street, and would be posted as such.

18. The following shall be addressed:
    - Lighting shall be revised on the cul-de-sac bulb at the northern portion of Road C (sheet 32) to reduce footcandles to 0.1 at a maximum.
    - A note shall be added to sheet 34 specifying if the street lighting is proposed after 11 PM. No other lights shall be permitted after 11 PM.
    - The credentials of the outdoor lighting consultant shall be provided to the Township.

    Howell Response: Lighting has been revised at the northern cul-de-sac to maintain 0.1 footcandles or less at the property line. Additionally, a note has been added to sheet 34 as requested and the lighting consultant credentials added to the lighting plans as well.

19. Demonstration of compliance with the requirements set forth in Section 149-925 and the above referenced Ordinance section is appropriate at the time of Land Development Plan application.

    Howell Response: No plan revision necessary. A landscaping plan has been provided as part of the conditional use application however, we understand this will be handled during land development.

20. The applicant shall clearly note the areas proposed for active recreation and the improvements to be provided as part of these areas, subject to the approval of the Township Planning Commission and Board of Supervisors.

    Howell Response: An area suitable for active recreation is provided on the open space plan. Detailed improvements for the active recreation areas are not required under the Ordinance. Maintenance notes for the open space areas have been added to the plan.

General Comments

21. On Sheet 6, Open Space 4 is not labeled.

    Howell Response: Open Space 4 is now labeled.

I trust that all comments have been addressed adequately. Please do not hesitate to contact me at 610-918-9002 with any questions.

Sincerely,
D.L. HOWELL & ASSOCIATES, INC.

Denny L. Howell, PE
President

David W. Gibbons, PE
Senior Engineer

HOWELL ENGINEERING
Local Knowhow. Engineered.

June 15, 2023

Mr. Jon Altshul, Township Manager
Westtown Township
1039 Wilmington Pike
West Chester, PA 19382

RE: Stokes Estate (Fox Clearing, LLC)
Conditional Use - Traffic Review
Westtown Township, Chester County

Dear Mr. Altshul:

This letter is in response to the June 7, 2023 Albert Federico Consulting, LLC (AFC) review of the above referenced conditional use application.

Listed below are our responses to the concerns identified in their review of the conditional use application. Also, enclosed for your review are copies of the updated plans. Where applicable, Howell Engineering has addressed each of these comments indicating what action has been taken to resolve the issues. **Any comments that are statements and do not require any action have been omitted in the list of responses.**

Conditional Use Plans

1.

a. Includes a centerline profile of Shiloh Road and evaluate the available sight distance for vehicles turning left from Shiloh Road into the proposed development.

Howell Response: Our office realizes that the previously provided plan sheet titled Shiloh Road Sight Distance Analysis mistakenly had specific sight distance layers turned off. These layers are now turned back on and provide the required and available safe sight stopping distance, and sight distance for vehicles making left hand turn into the development off Shiloh Road

b. Provide a speed study supporting the assumed travel speeds.

Howell Response: Please note there is no speed study required by the Township for sight distance purposes, however the Applicant's Traffic Engineer was conservative in the analysis utilizing a speed of 10 mph over the posted speed limit.

c. Ensure that the assumed grades are measured at the beginning of the braking distance.

Howell Response: While our office believes the grades utilized are consistent with the grades at the beginning of the braking distance, we also note that the grade at a point is valid for that one point only. Using the grade over the entire braking area is more realistic as the vehicle is continuously braking as the grade may change. In this instance however the grade through the braking area is fairly consistent.

2.

a. As submitted, Road "A", "B", "C" and "D" do not provide a continuous collector street.

Howell Response: The property is not adjacent to two collector streets such that there can be a continuous collector street as per the Ordinance. The proposed local road extension to service the proposed development is of the same roadway classification as the other roadways (e.g. Hunt Dr/Carolyn Dr; Hummingbird La; Tyson Dr; Sage Rd) in the residential area.

b. The site is proximate to several proposed trails and a recommended bike route. The Alternative Site Plans (sheets C1.01A and C1.01B) included with the submitted materials illustrate several potential trails and connections. It is recommended that the Board considers requiring easements to provide a future connection to proposed trails to the east and south of the property as illustrated in the Trails and Bikeways Map of the Township Comprehensive Plan.

Howell Response: The applicant is willing to further discuss trail connections.

3.

a. Shiloh Road is classified as a Collector; the Board may require dedication of an additional five feet of right of way along the site frontage. {§149-903C.1}

Howell Response: No plan revision necessary.

b. Road "C" should be revised to provide the required level areas approaching the intersection of Road "A". {§149-907E}

Howell Response: This does not apply to through streets. It is standard engineering practice to provide a leveling area when the vehicle will be coming to a stop.

c. Road "A", between "B" and "C", and Road "B", between "A" and "D", do not meet the minimum block length. {§149-913B}

Howell Response: Pursuant to the definition of Block in the Subdivision and Land Development Ordinance, the lots between Road B and C do not form a block as they are not entirely bounded by streets, therefore this ordinance section is not applicable.
Block -A tract of land bounded entirely by streets; by streets and a watercourse; by streets and a railroad; by streets and the corporate boundaries of the Township; or by streets and public land, or any combination of the above.

d. Sharp horizontal curvature should not be introduced near the bottom of a steep grade approaching or near the low point of a pronounced sag vertical curve. Road "A" (STA 8+98 to 15+30) and Road "D" (STA 8+73 to 12+33) should be revised to eliminate the overlapping curves using the minimum (150') horizontal radius and rate of curvature.

Howell Response: The roadways have been designed to meet Township Standards.

e. Consistent with A Policy on Geometric Design of Highways and Streets, Table 3-36 (Design Controls for Sag Vertical Curves) the minimum Design Rate of Vertical Curvature is 37.0.

Howell Response: The vertical curves have been revised to meet the required sight distance with a K value for sag curves of 0.37 or greater. Calculations for sight distance are provided on the profile sheets.

f. As presented, the northern edge of cul-de-sac "C" is ~5' higher than the existing grade. Provide additional information demonstrating that the adjacent retaining wall along the northern edge of the cul-de-sac can be constructed without encroaching into the adjacent property (Vanscovich - Parcel 67-20-20.6).

Howell Response: As noted by the reviewer this comment will be addressed during land development.

Traffic Impact Study

4. The future condition analyses assume that the traffic signal at Shiloh Road/Westtown-Thornton Road and Street Road is re-timed, reducing green times along Street Road (a PennDOT designated Critical Corridor) in favor of minor approaches. It is recommended that the Board consider a condition requiring the Applicant to contribute to the re-timing of the signal as assumed in the Study.

Howell Response: No plan revision necessary.

5. Traffic counts must be completed between April and November. {§149-804A(3)g} There is no objection to the Applicant requesting a Waiver as part of the Land Development application.

Howell Response: No plan revision necessary. The applicant will seek a waiver.

I trust that all comments have been addressed adequately. Please do not hesitate to contact me at 610-918-9002 with any questions.

Sincerely,
D.L. HOWELL & ASSOCIATES, INC.

Denny L. Howell, PE
President

David W. Gibbons, PE
Senior Engineer

RESIDENTIAL DEVELOPMENT

ART. VI – R1 RESIDENTIAL DISTRICT
SECT. 170-501.C.: CONDITIONAL USES
(2). RESIDENTIAL DEVELOPMENT (FLEXIBLE DEVELOPMENT PROCEDURE – ARTICLE IX)
ART. IX – FLEXIBLE DEVELOPMENT PROCEDURE
SECT. 170-903.: PERMITTED USES
A. SINGLE FAMILY DETACHED DWELLINGS
SEC. 170-904.: DENSITY STANDARDS
BASE DENSITY = 1.1 D.U./ACRE OF TRACT AREA (*SEE TRACT AREA CALCULATION)
BONUS DENSITY = 1.5 D.U./ACRE OF TRACT AREA (MAXIMUM ACHIEVABLE)

AREA AND BULK REGULATIONS	REQUIRED	PROPOSED
MAX. NET RESIDENTIAL DENSITY	4 UNITS/ACRE	3.30 UNITS/ACRE
MIN. DISTANCE FROM CURB	30 FT.	30 FT.
MIN. DISTANCE BETWEEN BUILDINGS	30 FT.	30 FT.
MAX. BUILDING HEIGHT	3 STORIES/38 FT.	<3 STORIES/38 FT.
SETBACK FROM TRACT BOUNDARY	50'	50'

TRACT AREA CALCULATION

TRACT AREA (GROSS)	3,523,402 S.F. / 80.886 ACS.(±)
EX. LEGAL R/W	4,663 SF.
EX. UTILITY EASEMENTS	260,525 SF.
AREA EQUAL TO 75% OF:	
FLOODPLAIN	– 144,110 S.F.
PROHIBITIVE SLOPES	– 70,941 S.F.
WETLANDS	– 61,077 S.F.
AREA EQUAL TO 25% OF SEASONALLY HIGH WATER TABLE SOILS	– 132,496 S.F.
TRACT AREA =	2,849,590 S.F. (65.418 AC.)
BASE DENSITY (1.1 MULTIPLIER)=	71 LOTS

OPEN SPACE

MINIMUM OPEN SPACE
= 40% GROSS TRACT AREA

REQUIRED
GROSS TRACT = 80.886 ACRES
80.886 ACRES X 40% = 32.35 ACRES

PROPOSED
GROSS OPEN SPACE = 47.62 ACRES (58.87% GROSS TRACT AREA)
QUALIFYING MIN. REQUIRED OPEN SPACE = 32.36 ACRES (40.01% GROSS TRACT AREA)
QUALIFYING INCREMENTAL BONUS O.S. = 12.20 ACRES (15.08% GROSS TRACT AREA)

SEE TABLE ON SHEET C01.6 FOR TABULATION

DENSITY CALCULATION

BASE DENSITY: 1.1 D.U. / TRACT AREA

BONUS DENSITY: +0.075 D.U. / 5% OF ADDITIONAL OPEN SPACE = (15.08% EXTRA) = 0.075 * 3 = 0.225 BONUS

MAXIMUM DENSITY = 1.1 + 0.225 = 1.325 D.U. * 65.418 ACS. = 86 LOTS ACHIEVABLE

RESIDENTIAL LOT AREA	25.74 ACRES
PROPOSED LOTS	85
DENSITY	3.30 DU/AC.
AVERAGE SIZE	0.303 ACRES

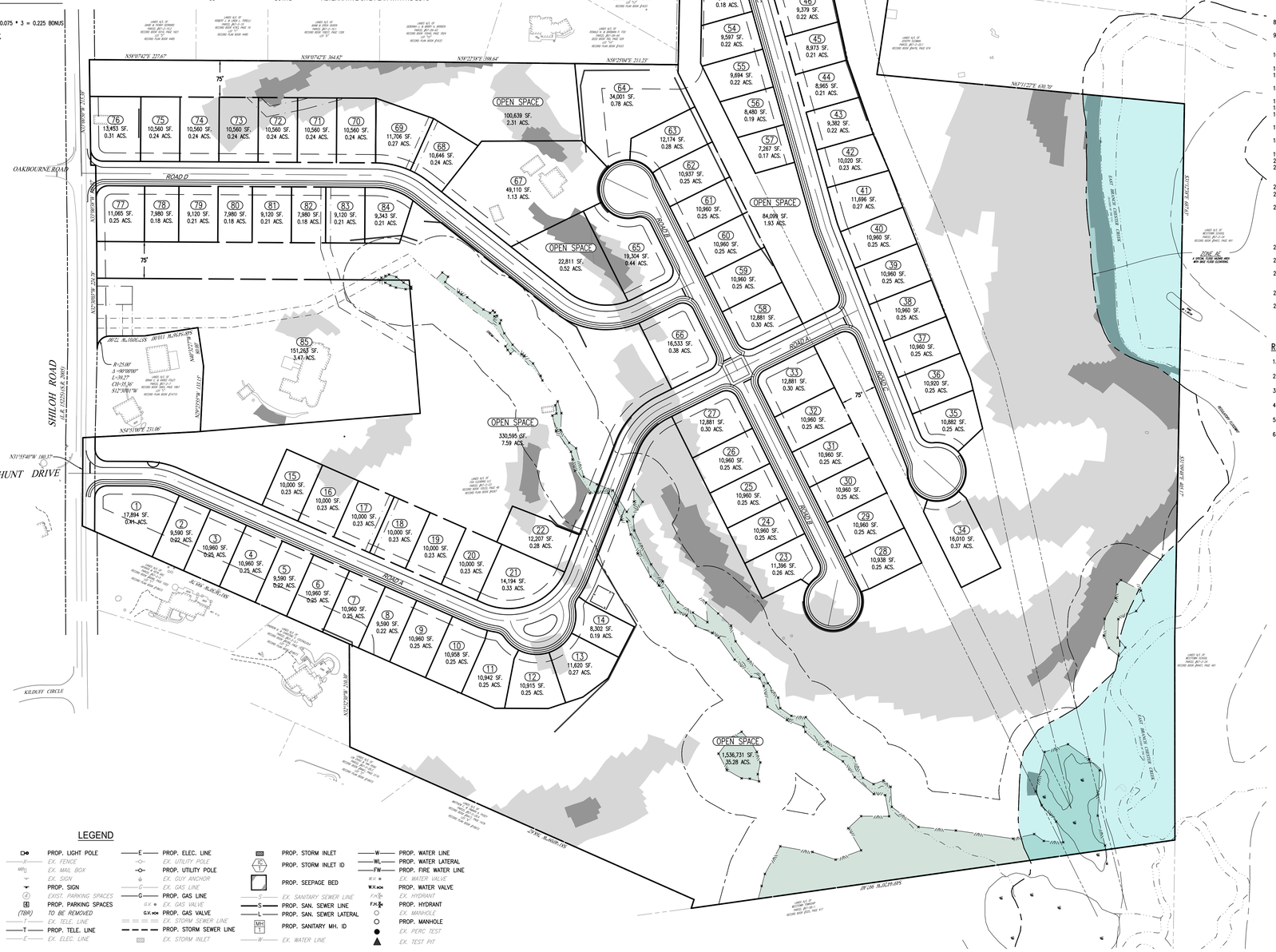
PRECAUTIONARY STEEP SLOPES (15-25%)

GROSS TRACT AREA = 80.886 ACS (3,523,402 SF)
25% OF THE GROSS TRACT AREA = 880,850 SF

AREA OF PRECAUTIONARY STEEP SLOPES = 547,921 SF < 25% OF THE TRACT AREA
THEREFORE SECTION 170-402.D.(3)(I) DOES NOT APPLY

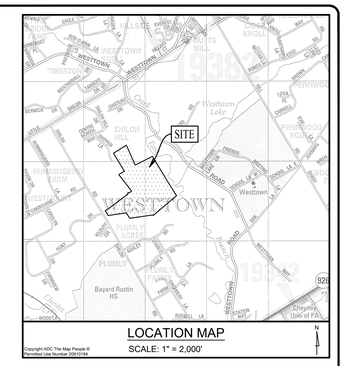
DRAWING INDEX

SHEET NUMBER	DRAWING NUMBER	SHEET TITLE
01	C01.1	OVERALL SITE PLAN
02	C01.2	SITE PLAN
03	C01.3	SITE PLAN
04	C01.4	SITE PLAN
05	C01.5	SITE PLAN
06	C01.6	OPEN SPACE PLAN
07	C02.1	OVERALL EXISTING RESOURCES PLAN
08	C02.2	EXISTING RESOURCES PLAN
09	C02.3	EXISTING RESOURCES PLAN
10	C02.4	EXISTING RESOURCES PLAN
11	C02.5	EXISTING RESOURCES PLAN
12	C03.1	OVERALL GRADING FEASIBILITY PLAN
13	C03.2	GRADING FEASIBILITY PLAN
14	C03.3	GRADING FEASIBILITY PLAN
15	C03.4	GRADING FEASIBILITY PLAN
16	C03.5	GRADING FEASIBILITY PLAN
17	C04.1	PROFILES
18	C04.2	PROFILES
19	C04.3	PROFILES
20	C04.4	PROFILES
21	C04.5	PROFILES
22	C05.1	CONSTRUCTION DETAILS
23	C06.1	OVERALL LANDSCAPE PLAN
24	C06.2	LANDSCAPE PLAN
25	C06.3	LANDSCAPE PLAN
26	C06.4	LANDSCAPE PLAN
27	C06.5	LANDSCAPE PLAN
28	C06.6	LANDSCAPE DETAILS
29	C07.1	OVERALL LIGHTING PLAN
30	C07.2	LIGHTING PLAN
31	C07.3	LIGHTING PLAN
32	C07.4	LIGHTING PLAN
33	C07.5	LIGHTING PLAN
34	C07.6	LIGHTING DETAILS
35	SD-1.1	SHILOH ROAD SIGHT DISTANCE ANALYSIS
36	SD-1.2	SHILOH ROAD SIGHT DISTANCE ANALYSIS
37	C01.1A	ALTERNATIVE SITE PLAN WITH HISTORIC HOME
38	C01.1B	ALTERNATIVE SITE PLAN WITH NO LOTS



LEGEND

EX. PROPERTY LINE	242 EXISTING CONTOUR	PROP. LIGHT POLE	PROP. ELEC. LINE	PROP. STORM INLET	PROP. WATER LINE
PROP. PROPERTY LINE	1243 PROPOSED CONTOUR	EX. FENCE	EX. UTILITY POLE	PROP. STORM INLET ID	PROP. WATER LATERAL
EX. RIGHT-OF-WAY	X 123.00 EXISTING SPOT ELEV.	EX. MAIL BOX	PROP. UTILITY POLE	PROP. SEEPAGE BED	PROP. FIRE WATER LINE
PROP. RIGHT-OF-WAY	x 123.00 NEW SPOT ELEV.	EX. SIGN	EX. GUY ANCHOR	EX. SANITARY SEWER LINE	EX. WATER VALVE
EX. MONUMENT	GEB2 SOILS TYPE	PROP. SIGN	EX. GAS LINE	PROP. SAN. SEWER LINE	PROP. WATER VALVE
PROP. MONUMENT	SOILS LINE	EXIST. PARKING SPACES	PROP. GAS LINE	PROP. SAN. SEWER LATERAL	EX. HYDRANT
EX. REBAR	EX. CONC. CURB	(TBR) PROP. PARKING SPACES TO BE REMOVED	G.V. EX. GAS VALVE	PROP. SANITARY MH. ID	PROP. HYDRANT
PROP. REBAR	PROP. CONC. CURB	EX. TELE. LINE	G.V. PROP. GAS VALVE	EX. WATER LINE	EX. MANHOLE
EX. EASEMENT	EX. EDGE OF PAVING	PROP. TELE. LINE	EX. STORM SEWER LINE		PROP. MANHOLE
PROP. EASEMENT	PROP. EDGE OF PAVING	EX. ELEC. LINE	PROP. STORM SEWER LINE		EX. PERC TEST
EX. WETLANDS	EX. LIGHT POLE		EX. STORM INLET		EX. TEST PIT



GENERAL NOTES

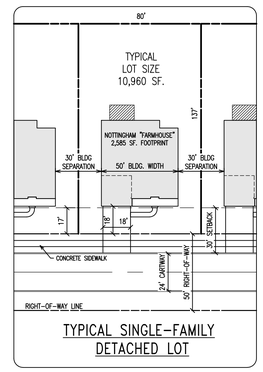
1. RECORD OWNER/MAILING ADDRESS: FOX CLEARING, LLC, 227 GRANITE RUN DRIVE, SUITE 100, LANCASTER, PA 17601
2. SITE ADDRESS: 1013 SHILOH ROAD, WEST CHESTER, PA 19382
3. TAX PARCEL #: 67-2-23
4. SOURCE OF TITLE: RECORD BOOK 10533 PAGE 48

	IVAR & JENNIFER L. GALILEA	IVAR & JENNIFER L. GALILEA	JOHN R. & CHRISTINE O'BRIEN
	1011 SHILOH ROAD	1011 SHILOH ROAD	1007 SHILOH ROAD
	WEST CHESTER, PA 19382	WEST CHESTER, PA 19382	WEST CHESTER, PA 19382
	1011 SHILOH ROAD	927 SHILOH ROAD	1007 SHILOH ROAD
	WEST CHESTER, PA 19382	WEST CHESTER, PA 19382	WEST CHESTER, PA 19382
	67-2-9	67-2-9	67-2-7.1
	RECORD BOOK 7447, PAGE 1358	RECORD BOOK 7447, PAGE 1358	RECORD BOOK 4373, PAGE 1479
5. LOT AREA:	64.956 ACRES (GROSS)		
	64.849 ACRES (NET OF SHILOH ROAD R/W)	9.133 ACRES	1.133 ACRES	5.664 ACRES

6. BOUNDARY, TOPOGRAPHY AND PHYSICAL IMPROVEMENTS SHOWN ARE FROM FIELD SURVEY BY HOWELL KLINE SURVEYING, LLC. PERFORMED DURING OCTOBER, NOVEMBER, DECEMBER 2020 AND JANUARY 2023.
7. CONTOURS & TOPOGRAPHIC INFORMATION PLOTTED FROM AERIAL SURVEY BY NOREAST MAPPING, INC. AERIAL MAPPING WAS PRODUCED TO NATIONAL MAP ACCURACY STANDARDS. GROUND CONTROL AND SUPPLEMENTAL DATA BY HOWELL KLINE SURVEYING, LLC. DATUM: NAVD 88 (COMPUTED USING GEOID12A) & NAD 83 (2011) (EPOCH:2010.0000) (AS DETERMINED BY GPS OBSERVATION). SITE BENCH = RM OF SANITARY MANHOLE LOCATED AT THE INTERSECTION OF HUNT DRIVE AND SHILOH ROAD, ELEVATION= 406.91', CONTOUR INTERVAL: 2 FEET.
8. UNDERGROUND UTILITIES SHOWN WERE PLOTTED FROM OBSERVABLE EVIDENCE AT THE TIME OF SURVEY AND INFORMATION FROM PLANS SUPPLIED BY UTILITY COMPANIES. NO GUARANTEE IS MADE THAT UNDERGROUND UTILITIES ARE ACCURATELY OR COMPLETELY SHOWN HEREON.
9. A PORTION OF THIS PROPERTY IS LOCATED WITHIN FLOOD HAZARD ZONE AE, A SPECIAL FLOOD HAZARD AREA WITH BASE FLOOD ELEVATIONS PER THE NATIONAL FLOOD INSURANCE RATE MAP FOR CHESTER COUNTY, PA, MAP NO. 42029C0215G, PANEL 215 OF 380, DATED SEPTEMBER 29, 2017. FLOOD PLAIN BOUNDARIES SHOWN HEREON WERE SCALED FROM THE ABOVE MENTIONED MAP.
10. WETLANDS BOUNDARY LINES WERE DELINEATED BY BRICKHOUSE ENVIRONMENTAL, CONSULTANTS AND ENGINEERS AND VORTEX ENVIRONMENTAL AND FLAGS LOCATED BY HOWELL KLINE SURVEYING, LLC. PERFORMED ON OCTOBER 30, 2020 AND JANUARY 2023 RESPECTIVELY.
11. THIS SITE IS CLASSIFIED AS "2-OF LOCAL HISTORIC VALUE" ON THE TOWNSHIP HISTORIC RESOURCES MAP.
12. THE PURPOSE OF THIS PLAN IS TO DETAIL THE PROPOSED SITE IMPROVEMENTS FOR CONDITIONAL USE OF AN 85 LOT RESIDENTIAL SUBDIVISION INCLUDING, BUT NOT LIMITED TO, CONCEPTUAL STORMWATER MANAGEMENT, GRADING, AND LANDSCAPING.
13. SOILS INFORMATION PROVIDED WITH SUPPORT FROM THE NATURAL RESOURCES CONSERVATION SERVICE. SOILS ATTRIBUTE DATA IS SERVED FROM THE NRCS SOIL DATA MART.
14. THE CONTRACTOR SHALL VERIFY THE LOCATION AND ELEVATION OF ALL EXISTING UTILITIES PRIOR TO THE START OF ANY CONSTRUCTION.
15. AN NPDES PERMIT IS REQUIRED TO BE OBTAINED PRIOR TO ANY CONSTRUCTION ACTIVITIES ON THIS SITE.
16. ALL DIMENSIONS ARE TO EDGE OF PAVING OR FACE OF BUILDING UNLESS NOTED OTHERWISE. SCALED DIMENSIONS SHALL NOT BE USED WITHOUT FIRST CONTACTING D.L. HOWELL & ASSOCIATES.
17. THIS PLAN PROPOSES PUBLIC WATER SUPPLY AND PUBLIC SEWER. PUBLIC WATER WILL BE PROVIDED BY AQUA PENNSYLVANIA. ALL WORK SHALL BE IN ACCORDANCE WITH THEIR STANDARDS AND SPECIFICATIONS.
18. AN INDIVIDUAL GRADING, AND EROSION AND SEDIMENT CONTROL PLAN FOR EACH BUILDING GROUP SHALL BE SUBMITTED WITH THE BUILDING PERMIT FOR THE TOWNSHIP'S REVIEW AND APPROVAL.
19. ALL MONUMENTS TO BE SET IN ACCORDANCE WITH WESTTOWN TOWNSHIP SUBDIVISION & LAND DEVELOPMENT ORDINANCE.
20. ALL PROPOSED UTILITIES MUST BE PLACED UNDERGROUND.
21. D.L. HOWELL & ASSOCIATES, INC. DOES NOT GUARANTEE THE ACCURACY OF THE LOCATIONS OF THE EXISTING SUBSURFACE UTILITY STRUCTURES SHOWN ON THE PLANS. NOR DOES D.L. HOWELL & ASSOCIATES, INC. GUARANTEE THAT ALL SUBSURFACE STRUCTURES ARE SHOWN. THE CONTRACTOR SHALL VERIFY THE LOCATION AND ELEVATION OF ALL UNDERGROUND UTILITIES PRIOR TO THE START OF THE WORK.
22. THE FINAL ARCHITECTURE AND LOT PLACEMENT FOR EACH HOME IS YET TO BE DETERMINED. FOOTPRINTS ARE FOR CONCEPTUAL PURPOSES ONLY.
23. REPRESENTATIVES OF WESTTOWN TOWNSHIP AND/OR OTHER GOVERNMENTAL AUTHORITIES SHALL HAVE PERMISSION TO GAIN ACCESS TO THE STORMWATER FACILITIES THROUGH A BLANKET EASEMENT OVER THE PROPERTY TO PERFORM INSPECTIONS, MAINTENANCE AND REPAIRS OF THE BASIN, AS NECESSARY.
24. STORMWATER DEVICES SHALL NOT BE REMOVED, ALTERED OF RELOCATED BY THE LANDOWNER. IN THE EVENT OF THE FAILURE OF THE LANDOWNER TO COMPLY WITH THESE CONDITIONS AND RESTRICTIONS, THE TOWNSHIP SHALL HAVE THE AUTHORITY TO RESTORE SAID STORMWATER MANAGEMENT FACILITIES TO THEIR ORIGINAL STATE AND THE COSTS THEREOF SHALL BE ASSESSED TO THE LANDOWNER. THE TOWNSHIP, BEFORE IT MAY EXERCISE THIS RIGHT, SHALL NOTIFY THE LANDOWNER BY CERTIFIED MAIL OF ITS INTENTION TO DO SO. THE NOTICE SHALL SET FORTH IN WHAT MANNER THE OWNER HAS ALTERED THE STORMWATER MANAGEMENT FACILITIES, AND IF THE OWNER FAILS TO CORRECT THE ALTERATION LISTED IN THE NOTICE FROM THE TOWNSHIP, THEN AND ONLY THEN THE TOWNSHIP MAY EXERCISE THIS RIGHT.
25. A SEWAGE FACILITIES PLANNING MODULE IS REQUIRED IN ACCORDANCE WITH THE SEWAGE FACILITIES PLANNING ACT (ACT 537). APPROVAL OF THIS PLAN IN NO WAY IMPLIES OR GUARANTEES THAT SUCH APPROVAL CAN BE OBTAINED.
26. ALL NEW SANITARY WORK, INCLUDING BUT NOT LIMITED TO GRAVITY SEWER MAIN, AND APPURTENANCES, MANHOLES, ETC., SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE RULES AND REGULATIONS OF WESTTOWN TOWNSHIP.
27. ALL STORM SEWERS AND APPURTENANCES SHALL BE CONSTRUCTED IN ACCORDANCE WITH REQUIREMENTS OF WESTTOWN TOWNSHIP AND THE PENNSYLVANIA DEPARTMENT OF TRANSPORTATION, AS APPLICABLE. WESTTOWN TOWNSHIP IS NOT RESPONSIBLE FOR INSTALLATION OR MAINTENANCE OF ANY STORMWATER FACILITIES NOT DEDICATED FOR PUBLIC USE.
28. NOTHING SHALL BE PLACED, PLANTED, SET OR PUT WITHIN THE AREA OF AN EASEMENT OF STORM DRAINAGE FACILITY THAT COULD ADVERSELY AFFECT THE FUNCTION OF THE EASEMENT, ANY EASEMENT AGREEMENT, OR THE STORM DRAINAGE FACILITY.
29. THE LIMITS OF DISTURBANCE SHALL BE STAKED IN THE FIELD PRIOR TO CLEARING OF ANY EARTH DISTURBANCE. ANY CHANGE OR ENCROACHMENT ONTO THESE AREAS WITHOUT CONSERVATION DISTRICT REVIEW AND APPROVAL MAY REQUIRE THE CONTRACTOR TO CEASE DISTURBANCE AND OBTAIN AN EARTH DISTURBANCE PERMIT. INSTALL TREE PROTECTION FENCING AROUND PERIMETER OF TREES WHERE LIMIT OF DISTURBANCE ABUTS WOODLANDS.

REFERENCE PLAN(S)

1. PLAN ENTITLED "PLAN OF SUBDIVISION FOR MILTON R. STOKES", PREPARED BY HENRY S. CONREY INC, DATED 10/29/1982, LAST REVISED 1/20/1983, RECORD PLAN BOOK #267.
2. PLAN ENTITLED "PLAN OF PROPERTY FOR HAWTHORNE", PREPARED BY INGRAM ENGINEERING SERVICES, INC., PLOTTED ON 6/29/2016, LAST REVISED 5/3/2016, RECORD PLAN BOOK #19973.
3. PLAN ENTITLED "FINAL LAN OF LOTS JOHN & CHRISTINE O'BRIEN", PREPARED BY ROBERT W. MATTOX, PLS INC., DATED 10/5/1998, LAST REVISED 11/5/1998, RECORD PLAN BOOK #14715.
4. PLAN ENTITLED "IVAR GALILEA", PREPARED BY MESKO ENGINEERING ASSOCIATES, INC., DATED 12/27/2005, LAST REVISED 2/8/2006, RECORD PLAN BOOK #17755.
5. PLAN ENTITLED "PRELIMINARY/FINAL PLAN OF SUBDIVISION FOR 1015 SHILOH ROAD", PREPARED BY EDWARD B. WALSH & ASSOCIATES, INC., DATED 11/11/2008, LAST REVISED 6/2/2009, RECORD PLAN BOOK #18673.
6. PLAN ENTITLED "FINAL SUBDIVISION PLAN – PROPERTY OF JAMES S. LEES JR., PREPARED BY G.D. HOUTMAN & SON, DATED 4/3/1978, LAST REVISED 4/13/1978, RECORD PLAN BOOK #1633.



TYPICAL SINGLE-FAMILY DETACHED LOT

RECORD OWNER/APPLICANT:
FOX CLEARING, LLC
227 GRANITE RUN DRIVE, SUITE 100
LANCASTER, PA 17601

OVERALL SITE PLAN

SCALE: 1"=100'

100 0 50 100 200

GRAPHIC SCALE
1 inch = 100 feet

DLHowell
Civil Engineering
Land Planning
Environmental
www.DLHowell.com
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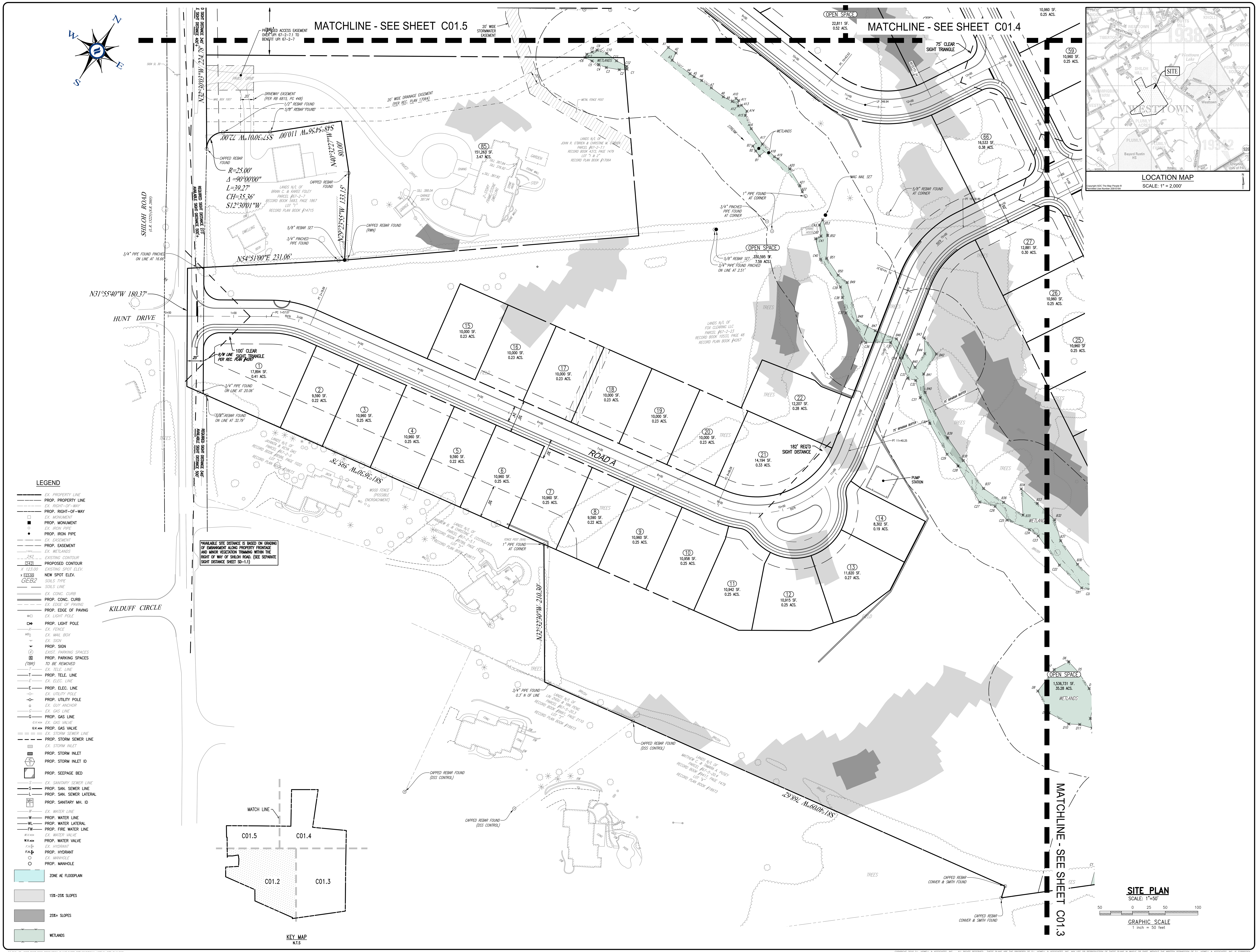
West Chester, PA 19380
Phone: (610) 918-9002
Fax: (610) 918-9003

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
DAVID W. GIBBONS
ENGINEER
PE076444

NO.	DATE	DESCRIPTION
1	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
2		
3		
4		
5		
6		
7		
8		

CONDITIONAL USE
OVERALL SITE PLAN
CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=100'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	01 SITE PLAN.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C01.1
SHEET	01 OF 38



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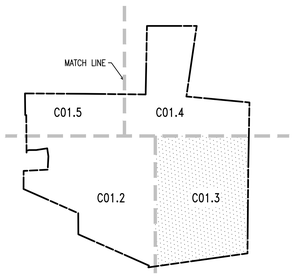
West Chester, PA 19380
Phone: (610) 918-9002
Fax: (610) 918-9003

REV.	DATE	DESCRIPTION
1	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
2		
3		
4		
5		
6		
7		
8		

CONDITIONAL USE
SITE PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

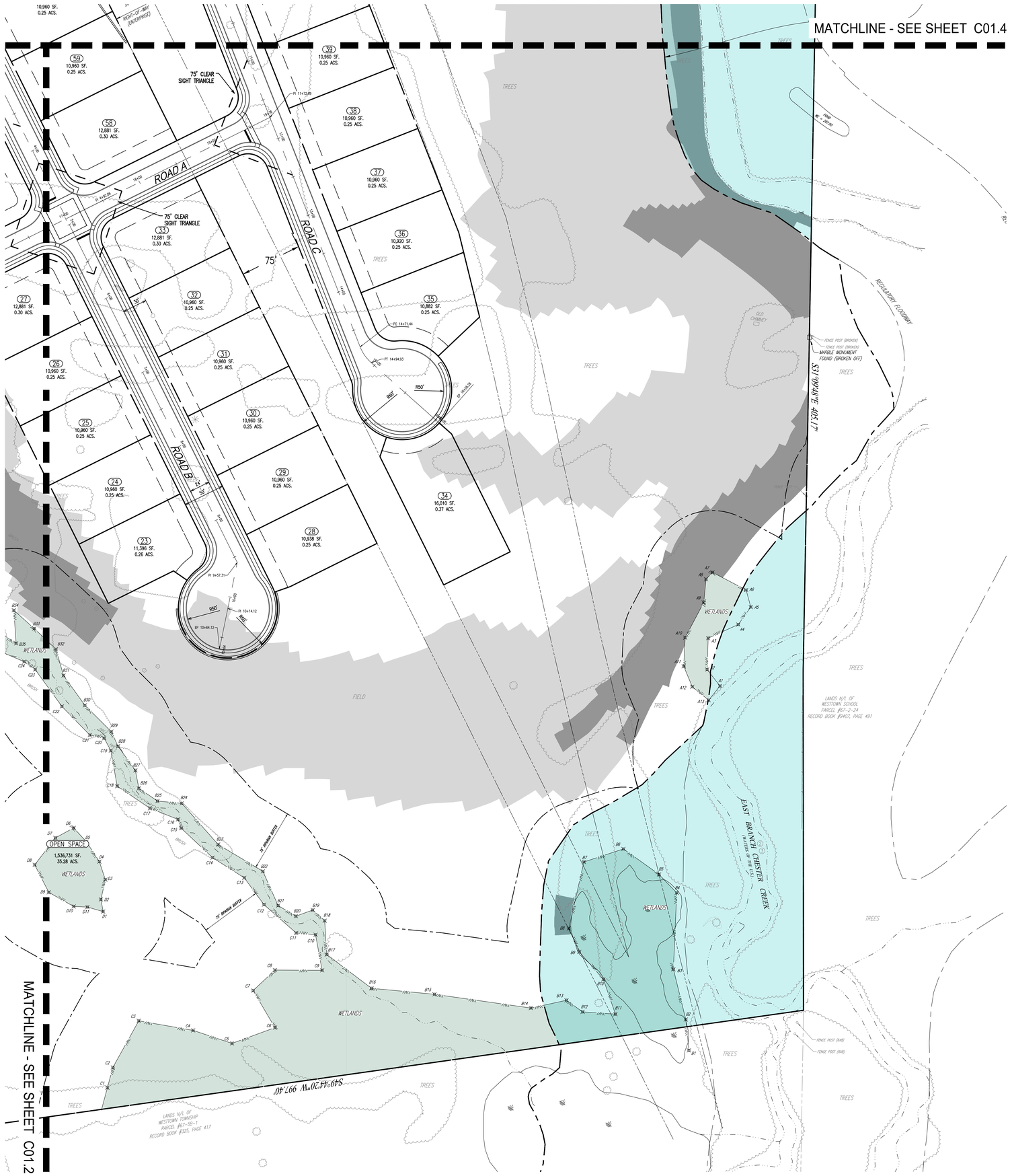
DATE: 04/14/23
SCALE: 1"=50'
DRAWN BY: ADM
CHECKED BY: DWG
PROJECT NO.: 3868
CAD FILE: 01 SITE PLAN.dwg
PLOTTED: 06/15/23
DRAWING NO.: C01.2
SHEET 02 OF 38

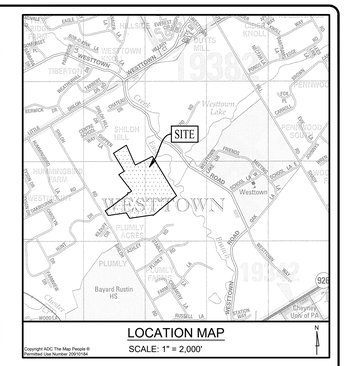


KEY MAP
N.T.S

LEGEND

- EX. PROPERTY LINE
- PROP. PROPERTY LINE
- EX. RIGHT-OF-WAY
- PROP. RIGHT-OF-WAY
- EX. MONUMENT
- PROP. MONUMENT
- EX. IRON PIPE
- PROP. IRON PIPE
- EX. EASEMENT
- PROP. EASEMENT
- EX. WETLANDS
- 242 EXISTING CONTOUR
- [242] PROPOSED CONTOUR
- x 123.00 EXISTING SPOT ELEV.
- x [123.00] NEW SPOT ELEV.
- GEB2 SOILS TYPE
- SOILS LINE
- EX. CONC. CURB
- PROP. CONC. CURB
- EX. EDGE OF PAVING
- PROP. EDGE OF PAVING
- EX. LIGHT POLE
- PROP. LIGHT POLE
- EX. FENCE
- EX. MAIL BOX
- EX. SIGN
- PROP. SIGN
- EXIST. PARKING SPACES
- PROP. PARKING SPACES
- (TBR) TO BE REMOVED
- EX. TELE. LINE
- T PROP. TELE. LINE
- EX. ELEC. LINE
- E PROP. ELEC. LINE
- EX. UTILITY POLE
- PROP. UTILITY POLE
- EX. GUY ANCHOR
- G EX. GAS LINE
- G PROP. GAS LINE
- G.V. EX. GAS VALVE
- G.V. PROP. GAS VALVE
- EX. STORM SEWER LINE
- PROP. STORM SEWER LINE
- EX. STORM INLET
- PROP. STORM INLET
- PROP. STORM INLET ID
- PROP. SEEPAGE BED
- EX. SANITARY SEWER LINE
- S PROP. SAN. SEWER LINE
- L PROP. SAN. SEWER LATERAL
- MH PROP. SANITARY MH. ID
- EX. WATER LINE
- W PROP. WATER LINE
- WL PROP. WATER LATERAL
- FW PROP. FIRE WATER LINE
- EX. WATER VALVE
- W.V. PROP. WATER VALVE
- EX. HYDRANT
- F.H. PROP. HYDRANT
- EX. MANHOLE
- PROP. MANHOLE
- ZONE AE FLOODPLAIN
- 15%-25% SLOPES
- 25%+ SLOPES
- WETLANDS





SITE PLAN
SCALE: 1"=50'

50 0 25 50 100
GRAPHIC SCALE
1 inch = 50 feet

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West Chester, PA 19380
Phone: (610) 918-9002
Fax: (610) 918-9003

NO.	REV.	DATE	DESCRIPTION
1		06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
2			
3			
4			
5			
6			
7			
8			

CONDITIONAL USE
SITE PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	01 SITE PLAN.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C01.3
SHEET	03 OF 38

MATCHLINE - SEE SHEET C01.5

SHIPPEN LANE

OH HILL DRIVE

LANDS N/L OF
EARL H. & DOLORES C. BROWN
PARCEL #67-2N-68
DEED BOOK #N67, PAGE 143
LOT "3"
RECORD PLAN BOOK #1633

30' EASEMENT
PER REC. PLAN #9015699

LANDS N/L OF
PAUL B. & SUSAN M. VANSCOVICH
PARCEL #67-2D-20.6
RECORD BOOK #5554, PAGE 1722

1-1/2" PIPE FOUND
N30°16'18"W 2.29'
FROM CORNER

1/2" REBAR FOUND

N57°46'08"E 495.31'

3/4" PIPE FOUND
1.3' N OF LINE

POST & RAIL FENCE

1" PINCHED
PIPE FOUND
AT CORNER

LANDS N/L OF
ANDREW & CAMILLE HOLSTEIN
PARCEL #67-2N-67
RECORD BOOK #9276, PAGE 2035
LOT "10"
RECORD PLAN BOOK #1633

R60'
R80'
PC 0+27.50
PT 0+47.50

3/4" PIPE FOUND
0.31' W OF LINE

SHED

TREES

CONCRETE MONUMENT FOUND

5/8" REBAR FOUND
ON LINE

LANDS N/L OF
CHARLES R. & MARILYN J. BOLZ
PARCEL #67-2N-66
RECORD BOOK #4883, PAGE 1343
LOT "12"
RECORD PLAN BOOK #1633

N21°09'07"W 56.63'

SHED

LANDS N/L OF
THE KAHN TRUST, DATED FEBRUARY 25, 2019, WALLACE J. KAHN
PARCEL #67-2N-65
RECORD BOOK #7900, PAGE 115
LOT "13"
RECORD PLAN BOOK #1633

LANDS N/L OF
RONALD N. & BARBARA P. FOX
PARCEL #67-2N-64
DEED BOOK 760, PAGE 529
LOT "14"
RECORD PLAN BOOK #1633

3/4" PIPE FOUND
AT CORNER

1" PIPE FOUND
AT CORNER

N58°25'04"E 211.23'

TREES

24" TREE

22" TREE

24" PINE

27" PINE

ROAD C

ROAD B

52
11,474 SF.
0.26 ACS.

51
9,605 SF.
0.22 ACS.

50
9,430 SF.
0.22 ACS.

49
9,140 SF.
0.21 ACS.

48
8,850 SF.
0.20 ACS.

47
9,759 SF.
0.22 ACS.

46
9,379 SF.
0.22 ACS.

45
8,973 SF.
0.21 ACS.

44
8,965 SF.
0.21 ACS.

43
9,382 SF.
0.22 ACS.

42
10,020 SF.
0.23 ACS.

41
11,696 SF.
0.27 ACS.

40
10,960 SF.
0.25 ACS.

39
10,960 SF.
0.25 ACS.

53
7,688 SF.
0.18 ACS.

54
9,597 SF.
0.22 ACS.

55
9,694 SF.
0.22 ACS.

56
8,480 SF.
0.19 ACS.

57
7,287 SF.
0.17 ACS.

59
10,960 SF.
0.25 ACS.

60
10,960 SF.
0.25 ACS.

61
10,960 SF.
0.25 ACS.

62
10,937 SF.
0.25 ACS.

63
12,174 SF.
0.28 ACS.

64
34,001 SF.
0.78 ACS.

65
19,304 SF.
0.44 ACS.

OPEN SPACE
84,099 SF.
1.93 ACS.

OPEN SPACE
22,811 SF.
0.52 ACS.

FIELD

PC 3+10.15
PT 3+33.99

PT 3+69.43

PI 0+50

PI 1+06.81

660'

R80'

PC 5+62.80
PT 10+43.76

50' R/W
RIGHT-OF-WAY
(ENTERPRISE)

75' CLEAR
SIGHT TRIANGLE

75' CLEAR
SIGHT TRIANGLE

LANDS N/L OF
JUSTIN R. POWER & MONICA NHAN
PARCEL #67-2-21
RECORD BOOK #10150, PAGE 1330

50' WIDE
PRIVATE ROADWAY

PAVED DRIVE

PAVED PARK

PAVED DRIVE

S27°56'29"E 710.57'

LANDS N/L OF
JOSEPH SLEIMAN
PARCEL #67-2-22.1
RECORD BOOK #9476, PAGE 674

1" PIPE FOUND
AT CORNER

MARBLE MONUMENT FOUND

N63°11'22"E 630.70'

1" PIPE FOUND
AT CORNER

APPROX. LOC. 60' WIDE
BUCKEYE/LAUREL PIPELINE CO. R/W
(PER MDB 115, PG 256)

60' R/W

S31°12'38"E 697.69'

EAST BRANCH CHESTER CREEK
(WITHIN 100' OF THE LEK)

LANDS N/L OF
WESTTOWN SCHOOL
PARCEL #67-2-24
RECORD BOOK #9407, PAGE 491

ZONE AE
A SPECIAL FLOOD HAZARD AREA
WITH BASE FLOOD ELEVATIONS.

MATCHLINE - SEE SHEET C01.2

MATCHLINE - SEE SHEET C01.3

MATCH LINE

C01.5 | C01.4

C01.2 | C01.3

KEY MAP
N.T.S

SITE

LOCATION MAP
SCALE: 1" = 2,000'

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N

W E S

SITE PLAN
SCALE: 1"=50'

50 0 25 50 100

GRAPHIC SCALE
1 inch = 50 feet

LEGEND

- EX. PROPERTY LINE
- PROP. PROPERTY LINE
- EX. RIGHT-OF-WAY
- PROP. RIGHT-OF-WAY
- EX. MONUMENT
- PROP. MONUMENT
- EX. IRON PIPE
- PROP. IRON PIPE
- EX. EASEMENT
- PROP. EASEMENT
- EX. WETLANDS
- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXISTING SPOT ELEV.
- NEW SPOT ELEV.
- SOILS TYPE
- SOILS LINE
- EX. CONC. CURB
- PROP. CONC. CURB
- EX. EDGE OF PAVING
- PROP. EDGE OF PAVING
- EX. LIGHT POLE
- PROP. LIGHT POLE
- EX. FENCE
- EX. MAIL BOX
- EX. SIGN
- PROP. SIGN
- EXIST. PARKING SPACES
- PROP. PARKING SPACES
- TO BE REMOVED
- EX. TELE. LINE
- PROP. TELE. LINE
- EX. ELEC. LINE
- PROP. ELEC. LINE
- EX. UTILITY POLE
- PROP. UTILITY POLE
- EX. GUY ANCHOR
- EX. GAS LINE
- PROP. GAS LINE
- EX. GAS VALVE
- PROP. GAS VALVE
- EX. STORM SEWER LINE
- PROP. STORM SEWER LINE
- EX. STORM INLET
- PROP. STORM INLET
- PROP. STORM INLET ID
- PROP. SEEPAGE BED
- EX. SANITARY SEWER LINE
- PROP. SAN. SEWER LINE
- PROP. SAN. SEWER LATERAL
- PROP. SANITARY MH. ID
- EX. WATER LINE
- PROP. WATER LINE
- PROP. WATER LATERAL
- PROP. FIRE WATER LINE
- EX. WATER VALVE
- PROP. WATER VALVE
- EX. HYDRANT
- PROP. HYDRANT
- EX. MANHOLE
- PROP. MANHOLE
- ZONE AE FLOODPLAIN
- 15%-25% SLOPES
- 25%+ SLOPES
- WETLANDS

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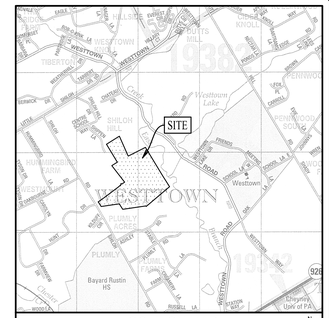
8			
7			
6			
5			
4			
3			
2	06/15/23		
1			

CONDITIONAL USE
SITE PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	01 SITE PLAN.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C01.4
SHEET	04 OF 38

Q:\3868, 30 2087\3868\3868 PRODUCTION PLANS\SHEET SET\CONDITIONAL USE\01- SITE PLAN.DWG



LOCATION MAP
SCALE: 1" = 2,000'

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CONDITIONAL USE
SITE PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

LEGEND

- EX. PROPERTY LINE
- PROP. PROPERTY LINE
- EX. RIGHT-OF-WAY
- PROP. RIGHT-OF-WAY
- EX. MONUMENT
- PROP. MONUMENT
- EX. IRON PIPE
- PROP. IRON PIPE
- EX. EASEMENT
- PROP. EASEMENT
- EX. WETLANDS
- 242 EXISTING CONTOUR
- 242 PROPOSED CONTOUR
- X 123.00 EXISTING SPOT ELEV.
- x 123.00 NEW SPOT ELEV.
- GeB2 SOILS TYPE
- SOILS LINE
- EX. CONC. CURB
- PROP. CONC. CURB
- EX. EDGE OF PAVING
- PROP. EDGE OF PAVING
- EX. LIGHT POLE
- PROP. LIGHT POLE
- EX. FENCE
- EX. MAIL BOX
- EX. SIGN
- PROP. SIGN
- EXIST. PARKING SPACES
- PROP. PARKING SPACES
- (TBR) TO BE REMOVED
- EX. TELE. LINE
- T PROP. TELE. LINE
- EX. ELEC. LINE
- E PROP. ELEC. LINE
- EX. UTILITY POLE
- PROP. UTILITY POLE
- EX. GUY ANCHOR
- EX. GAS LINE
- G PROP. GAS LINE
- EX. GAS VALVE
- G.V. PROP. GAS VALVE
- EX. STORM SEWER LINE
- PROP. STORM SEWER LINE
- EX. STORM INLET
- PROP. STORM INLET
- PROP. STORM INLET ID
- PROP. SEEPAGE BED
- EX. SANITARY SEWER LINE
- S PROP. SAN. SEWER LINE
- L PROP. SAN. SEWER LATERAL
- MH 1 PROP. SANITARY MH. ID
- EX. WATER LINE
- W PROP. WATER LINE
- WL PROP. WATER LATERAL
- FW PROP. FIRE WATER LINE
- EX. WATER VALVE
- W.V. PROP. WATER VALVE
- EX. HYDRANT
- PROP. HYDRANT
- EX. MANHOLE
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- ZONE AE FLOODPLAIN
- 15%-25% SLOPES
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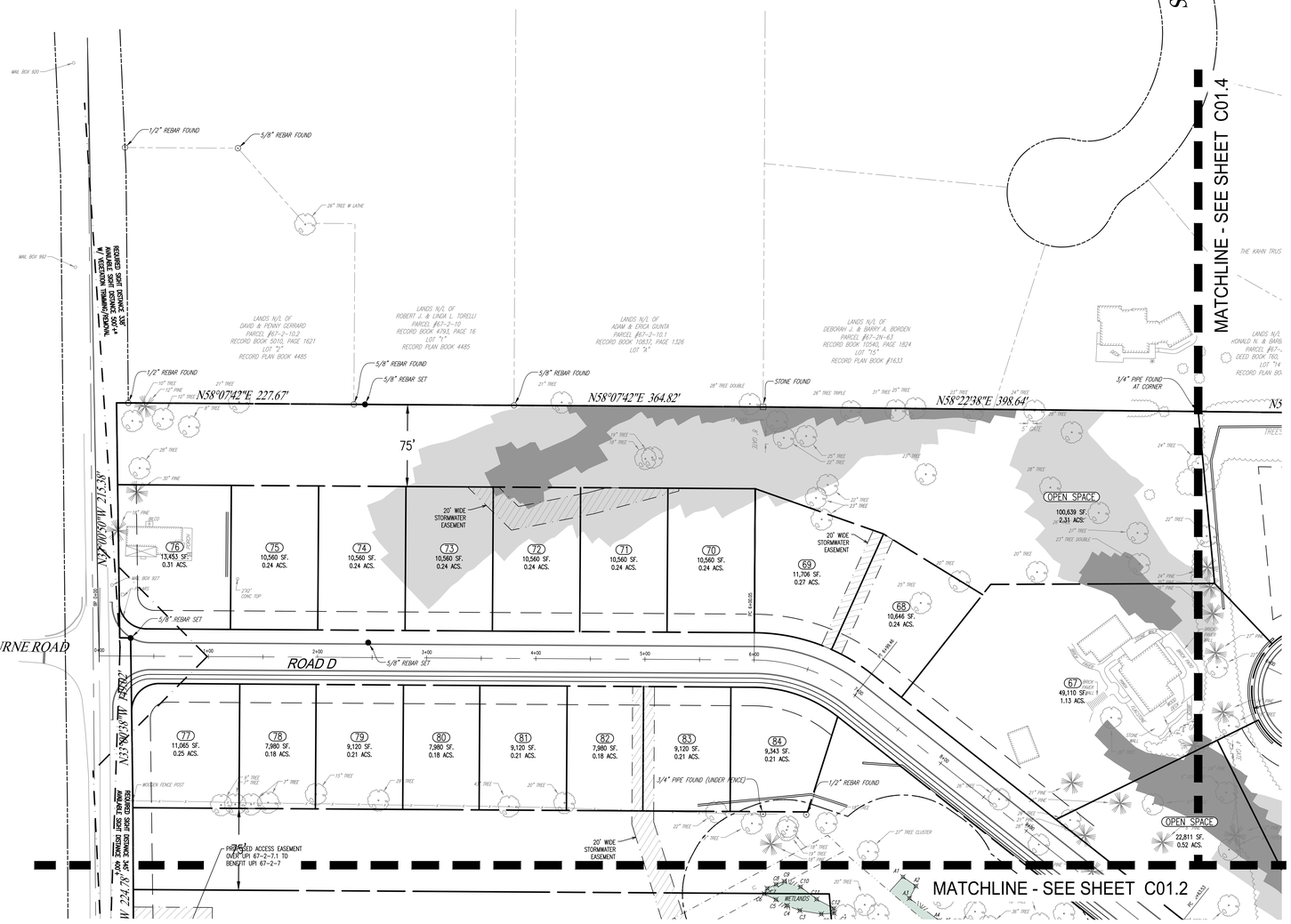
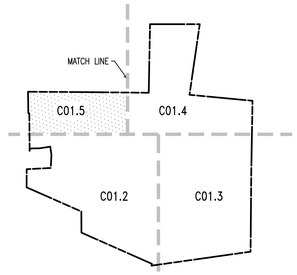
- WETLANDS





KEY MAP
N.T.S

SITE PLAN
SCALE: 1"=50'

50 0 25 50 100
GRAPHIC SCALE
1 inch = 50 feet

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
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PROJECT NO.:	3868
CAD FILE:	01 SITE PLAN.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C01.5
SHEET	05 OF 38

MANAGEMENT AND MAINTENANCE OF OPEN SPACE AREAS

THE HOMEOWNERS ASSOCIATION WILL OWN ALL OPEN SPACE AREAS, INCLUDING THOSE LISTED BELOW. THE HOMEOWNERS ASSOCIATION, OR A PROFESSIONAL MANAGEMENT COMPANY SELECTED BY THE HOMEOWNERS ASSOCIATION, WILL BE RESPONSIBLE FOR THE MANAGEMENT AND MAINTENANCE OF THE OPEN SPACE AREAS IN ACCORDANCE WITH PROVISIONS SET FORTH IN THE DECLARATION OF COVENANTS, RESTRICTIONS, EASEMENTS, CHARGES AND LIENS FOR THE STOKES RESIDENTIAL TRACT – A PLANNED COMMUNITY. FUNDING FOR THE MAINTENANCE OF THE OPEN SPACE WILL BE PROVIDED BY A CAPITAL CONTRIBUTION MADE BY EACH UNIT PURCHASER AT THE TIME OF SETTLEMENT WITH THE DEVELOPER, AS WELL AS BY AN ONGOING ANNUAL ASSESSMENT. THE OPEN SPACE FUNDING WILL PROVIDE FOR APPROPRIATE AND PROFESSIONAL MAINTENANCE OF ALL ASPECTS OF THE OPEN SPACE. THE TOWNSHIP WILL BE PROVIDED WITH THE RIGHT, IN THE HOMEOWNERS ASSOCIATION DECLARATION, TO UNDERTAKE THE MAINTENANCE OF THE OPEN SPACE IN THE EVENT THAT THE HOMEOWNERS ASSOCIATIONS FAILS TO PERFORM SUCH MAINTENANCE IN ACCORDANCE WITH THE FINAL OPEN SPACE MANAGEMENT PLAN. THE TOWNSHIP WILL HAVE THE ABILITY TO CHARGE THE HOMEOWNERS ASSOCIATION FOR ANY COSTS INCURRED IN MAINTAINING THE OPEN SPACE, AND RECORD LIENS FOR ANY UNPAID COST INCURRED BY THE TOWNSHIP.

THE LEVEL OF MAINTENANCE REQUIRED WITHIN THE COMMON OPEN SPACE IS RELATED TO THE TYPE OF USE. PASSIVE RECREATION AND NATURAL RESOURCE AREAS SUCH AS WOODED AREAS, WETLANDS, AND STREAM CORRIDORS WILL BE MAINTAINED AS CLOSE TO THEIR EXISTING CONDITIONS AS POSSIBLE WITH LIMITED MANAGEMENT.

THE OPEN SPACE AREAS SHALL BE MAINTAINED AS FOLLOWS:

WOODED AREAS

THE WOODED AREAS WILL BE LEFT IN THEIR NATURAL STATE AND MAINTAINED TO A LIMITED DEGREE TO PRESERVE THEIR HEALTH AND STABILITY. THIS SHALL BE ACCOMPLISHED BY THE REMOVAL OF DAMAGING INVASIVE VINES ALONG THE WOODLAND EDGES AND IN FOREST GAPS. LIVE AND DEAD TREES SHALL NOT BE CUT DOWN OR REMOVED UNLESS THEY POSE A THREAT TO HUMAN SAFETY. DEAD TREES SHALL BE LEFT STANDING AND LYING ON THE FOREST FLOOR FOR WILDLIFE HABITAT. THE REMOVAL OF NATIVE NON-INVASIVE TREES, SHRUBS, SEEDLINGS AND GROUNDCOVER IS NOT PERMITTED IN THE WOODED COMMON OPEN SPACE AREAS. THE COMMUNITY ASSOCIATION SHALL MONITOR THE WOODED AREAS.

MEADOWS

ALL OF THE EXISTING AGRICULTURAL FIELDS WILL BE PLANTED WITH NATIVE GRASSES AND CONVERTED TO MEADOWS IF NOT ALREADY CONVERTED AT THE TIME OF CONSTRUCTION. STORMWATER MANAGEMENT AREAS SHALL BE SEEDED AND LANDSCAPED WITH INDIGENOUS SPECIES AND MAINTAINED AS NATURALIZED AREAS. NEWLY SEEDED MEADOW AREAS SHALL BE MOWED TO A HEIGHT OF SIX INCHES WHENEVER PLANTS REACH TWELVE INCHES IN HEIGHT FOR THE FIRST YEAR. THEREAFTER, AND FOR ESTABLISHED MEADOW AREAS MOW TO A HEIGHT OF 12 TO 18 INCHES ONCE ANNUALLY PRIOR TO APRIL 15.

RIPARIAN CORRIDOR

LIMITING DISTURBANCE ADJACENT TO WETLANDS AND STREAMS WILL PROVIDE THE BEST PROTECTION FOR THESE AREAS. THE VEGETATION WITHIN THE WETLAND AND RIPARIAN CORRIDOR AREAS SHALL NOT BE DISTURBED. THE VEGETATION WILL PROVIDE AN EFFECTIVE BUFFER AND NATURALLY CONTROL EROSION AND SEDIMENTATION, ABSORB CHEMICALS AND EXCESS NUTRIENTS, AND PROMOTE INFILTRATION OF STORMWATER RUNOFF. ENCOURAGE WOODLAND GROWTH WITHIN THE CENTRAL RIPARIAN CORRIDOR, PARTICULARLY ADJACENT TO STREAM BANKS, TO PROMOTE SHADING OF THE WATER SURFACE. MONITOR AND CONTROL INVASIVE WEEDS TO PREVENT COMPETITION WITH NATIVE SPECIES. INSPECT ANNUALLY FOR COLONIZATION OF INVASIVE PLANTS. REMOVE INVASIVE PLANTS WITHOUT DISTURBING DESIRABLE SPECIES. LIMIT THE USE OF BROADLY APPLIED HERBICIDE SPRAYS IN FAVOR OF HAND REMOVAL AND LOCALIZED APPLICATION OF HERBICIDE SPRAYS (WHEN AIR IS STILL). INSPECT RIPARIAN CORRIDOR AT A MINIMUM ONCE A YEAR AND AFTER SEVERE STORMS FOR EVIDENCE OF EROSION, SEDIMENT, DEPOSIT, OR CONCENTRATED FLOW CHANNELS. REPAIRS SHOULD BE MADE AS SOON AS POSSIBLE TO HALT EROSION AND STABILIZE ANY EFFECTED AREAS. STABILIZE AREAS SUBJECT TO EROSION USING A NATIVE MEADOW SEED MIX IN MEADOW AREAS OR IN WOODED AREAS USING NATIVE SHRUBS AND/OR TREES CAPABLE OF QUICKLY GENERATING A DENSE FIBROUS ROOT SYSTEM, SUCH AS SHRUBBY DOGWOODS (SILKY DOGWOOD, GRAY DOGWOOD, AND RES OSIER DOG WOOD), VIRGINIA SWEETSPIRE, ALDERS, WILLOWS, SYCAMORES, AND RIVER BIRCH. PERIODICALLY MONITOR STREAMBED FLOWS, PARTICULARLY AFTER SEVERE STORM EVENTS. NATURAL DEBRIS SHALL NOT BE REMOVED FROM THE STREAM BED, UNLESS IT IS SIGNIFICANTLY IMPEDING THE FLOW OF WATER IN THE STREAM AND CAUSING EXCESSIVE FLOODING. SHOULD DEBRIS REMOVAL BE NECESSARY, DEBRIS SHOULD BE LEFT AT A POINT JUST ABOVE THE STREAM BANK TO ENHANCE WILDLIFE HABITAT AND ENSURE NUTRIENT RECYCLING. REMOVAL OF DEBRIS SHOULD BE LIMITED TO THAT REQUIRED TO RETURN STREAM FLOW TO ITS NATURAL STATE. IF POSSIBLE, LIMIT ACTIVITIES WITHIN NATURALIZED AREAS, INCLUDING THE RIPARIAN CORRIDOR, BETWEEN APRIL 15 AND AUGUST 15. DISTURBANCE WITHIN THE PERIOD CAN BE DETRIMENTAL TO A VARIETY OF WILDLIFE.

COMMON OPEN SPACE

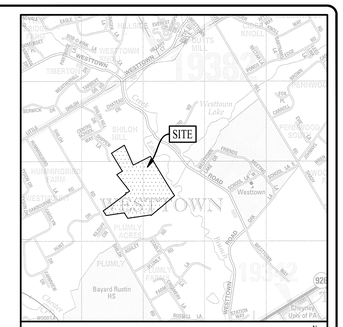
THE COMMON OPEN SPACE AREAS SHALL SERVE AS AREAS FOR PASSIVE AND INFORMAL ACTIVE RECREATION. THESE AREAS ARE LOCATED THROUGHOUT THE COMMUNITY AND WILL GENERALLY BE KEPT AS MEADOW AND/OR LAWN AREAS. THE HOMEOWNERS ASSOCIATION SHALL BE RESPONSIBLE FOR MAINTENANCE OF THE AREAS TO ENSURE THAT THESE AREAS PROVIDE A USABLE TRANSITION BETWEEN THE PROPOSED COMMUNITY AND THE NATURAL RESOURCE PROTECTION AREAS.

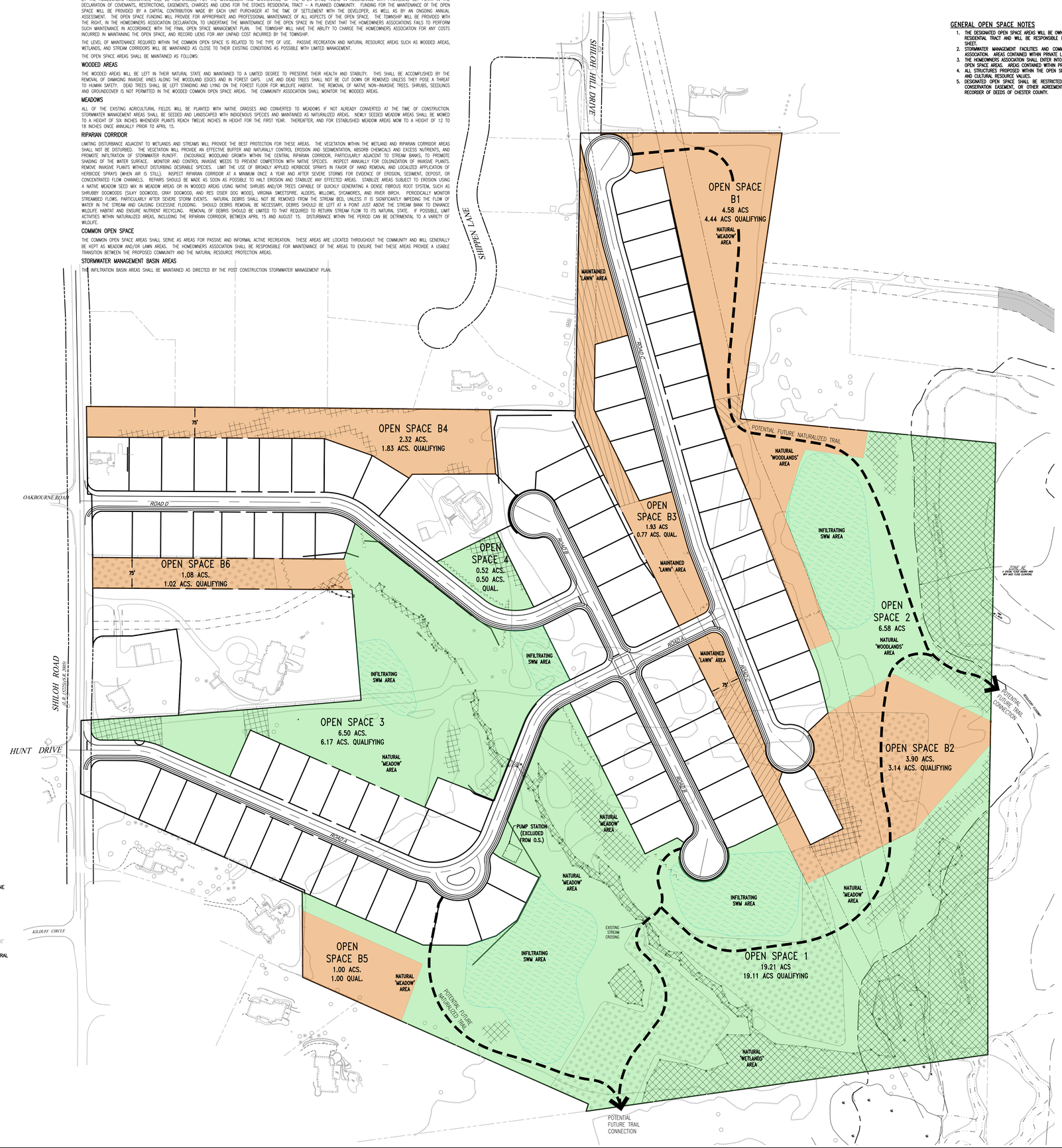
STORMWATER MANAGEMENT BASIN AREAS

THE INFILTRATION BASIN AREAS SHALL BE MAINTAINED AS DIRECTED BY THE POST CONSTRUCTION STORMWATER MANAGEMENT PLAN.

GENERAL OPEN SPACE NOTES

1. THE DESIGNATED OPEN SPACE AREAS WILL BE OWNED AND MAINTAINED BY THE HOME OWNERS ASSOCATION (HOA) WITHIN THE RESIDENTIAL TRACT AND WILL BE RESPONSIBLE FOR THE OPEN SPACE MANAGEMENT AND MAINTENANCE LISTED ON THIS SHEET.
2. STORMWATER MANAGEMENT FACILITIES AND COMMON OPEN SPACE AREAS WILL BE MAINTAINED BY THE HOMEOWNERS ASSOCIATION. AREAS CONTAINED WITHIN PRIVATE LOTS WILL BE MAINTAINED BY THE LOT OWNER.
3. THE HOMEOWNERS ASSOCIATION SHALL ENTER INTO AN ANNUAL CONTRACT FOR LAWN MAINTENANCE AND LANDSCAPING OF ALL OPEN SPACE AREAS. AREAS CONTAINED WITHIN PRIVATE LOTS WILL BE MAINTAINED BY THE LOT OWNER.
4. ALL STRUCTURES PROPOSED WITHIN THE OPEN SPACE AREAS SHALL BE SITED TO HAVE MINIMAL IMPACT ON THE NATURAL AND CULTURAL RESOURCE VALUES.
5. DESIGNATED OPEN SPACE SHALL BE RESTRICTED FROM FURTHER SUBDIVISION OR DEVELOPMENT BY DEED RESTRICTION, CONSERVATION EASEMENT, OR OTHER AGREEMENT IN A FORM ACCEPTABLE TO THE TOWNSHIP AND RECORDED IN THE RECORDER OF DEEDS OF CHESTER COUNTY.





LEGEND

- EX. PROPERTY LINE
- PROP. PROPERTY LINE
- EX. RIGHT-OF-WAY
- PROP. RIGHT-OF-WAY
- EX. MONUMENT
- PROP. MONUMENT
- EX. IRON PIPE
- PROP. IRON PIPE
- EX. EASEMENT
- PROP. EASEMENT
- EX. WETLANDS
- EX. EXISTING CONTOUR
- PROPOSED CONTOUR
- EX. SPOT ELEV.
- NEW SPOT ELEV.
- EX. SOILS TYPE
- SOILS LINE
- EX. CONIC CURB
- PROP. CONIC CURB
- EX. EDGE OF PAVING
- PROP. EDGE OF PAVING
- EX. LIGHT POLE
- PROP. LIGHT POLE
- EX. FENCE
- EX. MAIL BOX
- EX. SIGN
- PROP. SIGN
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- PROP. PARKING SPACES
- TO BE REMOVED
- EX. TELE. LINE
- PROP. TELE. LINE
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- EX. GUY ANCHOR
- EX. GAS LINE
- PROP. GAS LINE
- EX. GAS VALVE
- PROP. GAS VALVE
- EX. STORM SEWER LINE
- PROP. STORM SEWER LINE
- EX. STORM INLET
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- PROP. WATER LATERAL
- PROP. FIRE WATER LINE
- EX. WATER VALVE
- PROP. WATER VALVE
- EX. HYDRANT
- PROP. HYDRANT
- EX. MANHOLE
- PROP. MANHOLE

OPEN SPACE

MINIMUM OPEN SPACE
= 40% GROSS TRACT AREA

REQUIRED
GROSS TRACT = 80.886 ACRES
80.886 ACRES X 40% = 32.35 ACRES

PROPOSED
GROSS OPEN SPACE = 47.62 ACRES (58.87% GROSS TRACT AREA)
QUALIFYING MIN. REQUIRED OPEN SPACE = 32.36 ACRES (40.01% GROSS TRACT AREA)
QUALIFYING INCREMENTAL BONUS O.S. = 12.20 ACRES (15.08% GROSS TRACT AREA)

SEE TABLE BELOW FOR TABULATION

- REQUIRED MINIMUM COMMON OPEN SPACE (40% OF THE GROSS TRACT AREA)
- INCREMENTAL BONUS OPEN SPACE AREA
- NON-QUALIFYING OPEN SPACE (AREAS LESS THAN 75' IN WIDTH & AREAS NOT LESS THAN 0.5 ACRES OF CONTIGUOUS AREA, PUMP STATION DRIVE AND STRUCTURE)
- OPEN SPACE AREAS WITHIN FLOODPLAIN, WETLANDS, AND STEEP SLOPES GREATER THAN 25%, STORMWATER MANAGEMENT FACILITIES
- AREAS USED FOR SUBSURFACE INFILTRATION WITH OPEN STORAGE ACCESSORY TO INFILTRATION FACILITIES

	Min. Required Common Open Space Area (40%)							
	1	2	3	4			TOTAL	
Gross Area (Acres)	19.21	6.58	6.5	0.52			32.81	
- Areas less than 75' in width	0	0	0.31	0			0.31	
- Areas less than 1/2 acre	0	0	0	0			0	
-Non-infiltrating SWM Facilities	0.03	0	0.02	0.02			0.07	
-Pump Station and other miscellaneous impervious	0.07	0	0	0			0.07	% G.T.A.
Qualifying Base Open Space	**19.11**	**6.58**	**6.17**	**0.50**			**32.36**	**40.01%**
Floodplain	2.78	2.28	0	0			5.06	
Area of 25%+ Slopes	1.25	0.57	0.13	0.16			2.11	
Wetland/Waterbodies	1.74	0	0.14	0			1.88	% Base OS
Area of Floodplain, wetland, slopes > 25% in Min. Required Common Open Space (Max. 50% allowed)	**5.77**	**2.85**	**0.27**	**0.16**			**9.05**	**27.97%**

	Bonus Open Space Area						
	B1	B2	B3	B4	B5	B6	TOTAL
Gross Area (Acres)	4.58	3.9	1.93	2.32	1	1.08	14.81
- Areas less than 75' in width	0.13	0.49	1.15	0	0	0	1.77
- Areas less than 1/2 acre	0	0		0	0	0	0
-Floodplain	0	0	0	0	0	0	0
-Area of 25%+ Slopes (including proposed)	0	0.27	0	0.24	0	0	0.51
-Wetland/Waterbodies	0	0	0	0	0	0.01	0.01
-Impervious Surfaces	0	0	0	0	0	0	0
-Stormwater Facilities	0.01	0	0.01	0.25	0	0.05	0.32
Qualifying Bonus Open Space	**4.44**	**3.14**	**0.77**	**1.83**	**1.00**	**1.02**	**12.2**

Bonus % per G.T.A.
15.08%

AREA AVAILABLE FOR ACTIVE RECREATION
NET TRACT AREA = 2,849,580 S.F.
AREA REQUIRED (10% NET TRACT AREA) X 10%
284,959 SF -OR- 6.54 ACRES

AREA SUITABLE FOR ACTIVE RECREATION – 6.61 ACRES

OPEN SPACE PLAN

SCALE: 1"=100'

100 0 50 100 200

GRAPHIC SCALE
1 inch = 100 feet

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Phone: (610) 918-9002
Fax: (610) 918-9003

REV.	DATE	DESCRIPTION
1	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
2		
3		
4		
5		
6		
7		

CONDITIONAL USE
OPEN SPACE PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=100'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	01 SITE PLAN.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C01.6
SHEET	06 OF 38

BEDROCK GEOLOGY				
MAP SYMBOL	NAME	AGE	LITH1	LITH2
fgh	Felsic and intermediate gneiss	Precambrian	Felsic gneiss	Intermediate gneiss

SOILS LEGEND:

SYMBOL	SOIL NAME
Bo	GLENVILLE CHANNERY LOAM, 3 TO 8 PERCENT SLOPES (SEASONALLY HIGH WATER TABLE)
Co	CODORUS SILT LOAM (AGRICULTURALLY SUITED SOILS)
GdB	GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES (AGRICULTURALLY SUITED SOILS)
GdC	GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES (AGRICULTURALLY SUITED SOILS)
GdF	GLADSTONE GRAVELLY LOAM, 8 TO 25 PERCENT SLOPES VERY BOULDERY
Ho	HATBORO SILT LOAM
MaD	MANOR SILT LOAM, 15 TO 25 PERCENT SLOPES
UrB	URBAN LAND-GLADSTONE COMPLEX, 0 TO 8 PERCENT

LEGEND

- EX. PROPERTY LINE
- PROP. PROPERTY LINE
- EX. RIGHT-OF-WAY
- PROP. RIGHT-OF-WAY
- EX. MONUMENT
- PROP. MONUMENT
- EX. IRON PIPE
- PROP. IRON PIPE
- EX. EASEMENT
- PROP. EASEMENT
- EX. WETLANDS
- 242 EXISTING CONTOUR
- 242 PROPOSED CONTOUR
- X 123.00 EXISTING SPOT ELEV.
- x 123.00 NEW SPOT ELEV.
- GEB2 SOILS TYPE
- SOILS LINE
- EX. CONC. CURB
- PROP. CONC. CURB
- EX. EDGE OF PAVING
- PROP. EDGE OF PAVING
- EX. LIGHT POLE
- PROP. LIGHT POLE
- EX. FENCE
- EX. MAIL BOX
- EX. SIGN
- PROP. SIGN
- EXIST. PARKING SPACES
- PROP. PARKING SPACES (TBR) TO BE REMOVED
- EX. TELE. LINE
- PROP. TELE. LINE
- EX. ELEC. LINE
- PROP. ELEC. LINE
- EX. UTILITY POLE
- PROP. UTILITY POLE
- EX. GUY ANCHOR
- EX. GAS LINE
- PROP. GAS LINE
- EX. GAS VALVE
- PROP. GAS VALVE
- EX. STORM SEWER LINE
- PROP. STORM SEWER LINE
- EX. STORM INLET
- PROP. STORM INLET
- PROP. STORM INLET ID
- PROP. SEEPAGE BED
- EX. SANITARY SEWER LINE
- PROP. SAN. SEWER LINE
- PROP. SAN. SEWER LATERAL
- PROP. SANITARY MH. ID
- EX. WATER LINE
- PROP. WATER LINE
- PROP. WATER LATERAL
- PROP. FIRE WATER LINE
- EX. WATER VALVE
- PROP. WATER VALVE
- EX. HYDRANT
- PROP. HYDRANT
- EX. MANHOLE
- PROP. MANHOLE
- ZONE AE FLOODPLAIN
- 15%-25% SLOPES
- 25%+ SLOPES
- WETLANDS

OVERALL EXISTING RESOURCES PLAN

SCALE: 1"=100'

100 0 50 100 200

GRAPHIC SCALE
1 inch = 100 feet

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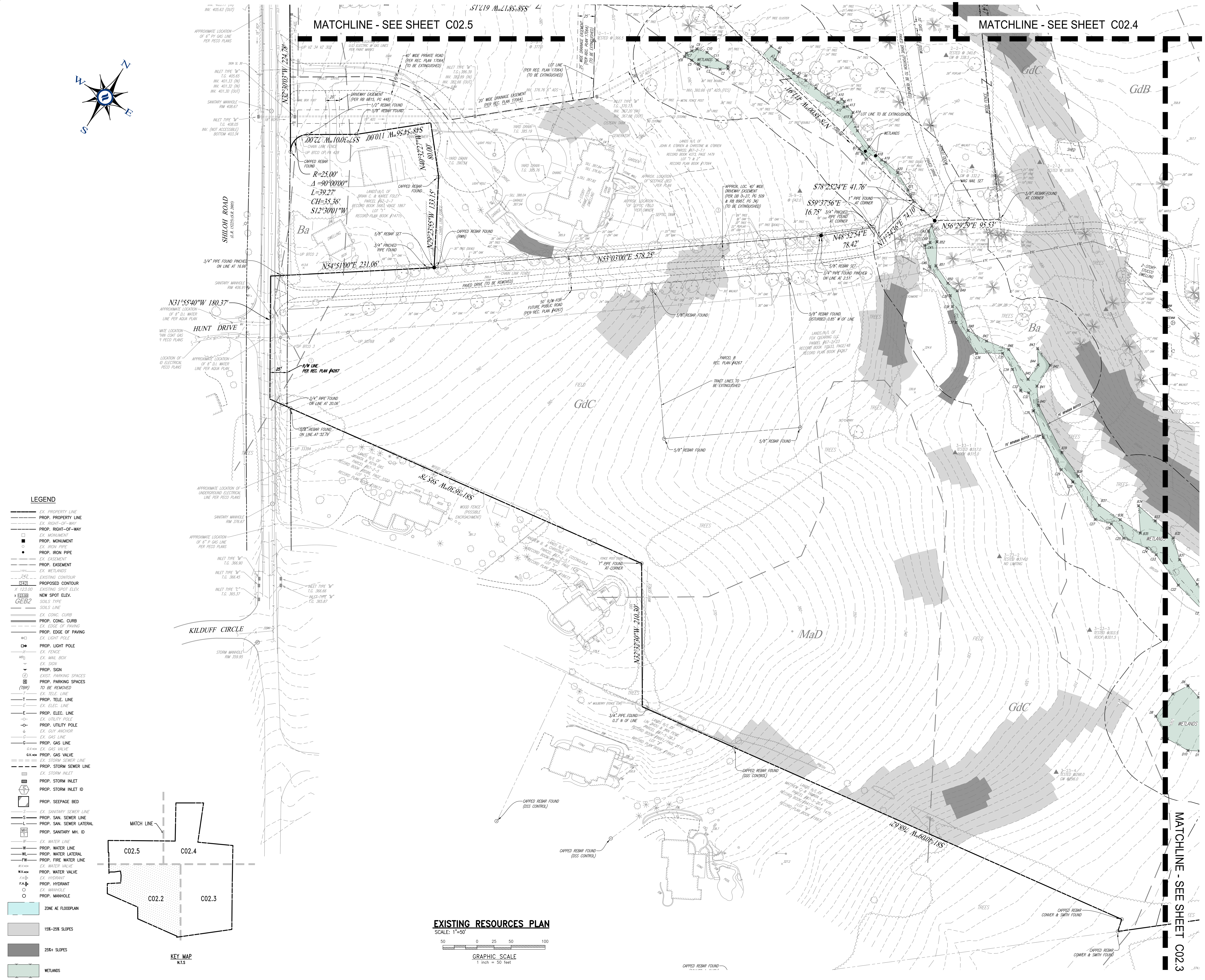
CONDITIONAL USE
OVERALL EXISTING RESOURCES PLAN
CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=100'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE/ DS OVERALL EXISTING RESOURCES PLAN.dwg	
PLOTTED:	06/15/23
DRAWING NO.:	C02.1
SHEET	07 OF 38



EXISTING RESOURCES PLAN

SCALE: 1"=50'

GRAPHIC SCALE
1 inch = 50 feet

SOILS LEGEND:

SYMBOL	SOIL NAME
Ba	EDGEMONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES
Co	CODORUS SILT LOAM (AGRICULTURALLY SUITED SOILS)
GdB	GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES (AGRICULTURALLY SUITED SOILS)
GdC	GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES (AGRICULTURALLY SUITED SOILS)
GdF	GLADSTONE GRAVELLY LOAM, 8 TO 25 PERCENT SLOPES VERY BOULDERY
Ha	HATBORO SILT LOAM
MaD	MANOR SILT LOAM, 15 TO 25 PERCENT SLOPES
UrlB	URBAN LAND GLADSTONE COMPLEX, 0 TO 8 PERCENT

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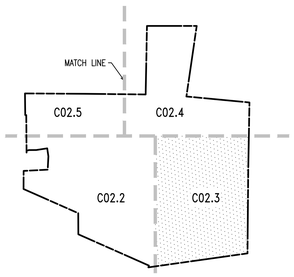
7		
8		

CONDITIONAL USE
EXISTING RESOURCES PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	05 OVERALL EXISTING RESOURCES PLAN.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C02.2
SHEET	08 OF 38

Q:\CIVIL 3D JOBS\3868\3868 PRODUCTION PLANS\SHEET SET\CONDITIONAL USE\05 OVERALL EXISTING RESOURCES PLAN.DWG



KEY MAP
N.T.S

MATCHLINE - SEE SHEET C02.4

MATCHLINE - SEE SHEET C02.2

LEGEND

- EX. PROPERTY LINE
- PROP. PROPERTY LINE
- EX. RIGHT-OF-WAY
- PROP. RIGHT-OF-WAY
- EX. MONUMENT
- PROP. MONUMENT
- EX. IRON PIPE
- PROP. IRON PIPE
- EX. EASEMENT
- PROP. EASEMENT
- EX. WETLANDS
- 242 EXISTING CONTOUR
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- 123.00 NEW SPOT ELEV.
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- SOILS LINE
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- EX. STORM INLET
- PROP. STORM INLET
- PROP. STORM INLET ID
- PROP. SEEPAGE BED
- EX. SANITARY SEWER LINE
- PROP. SAN. SEWER LINE
- PROP. SAN. SEWER LATERAL
- MH 1 PROP. SANITARY MH. ID
- EX. WATER LINE
- PROP. WATER LINE
- PROP. WATER LATERAL
- PROP. FIRE WATER LINE
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- PROP. WATER VALVE
- EX. HYDRANT
- PROP. HYDRANT
- EX. MANHOLE
- PROP. MANHOLE
- ZONE AE FLOODPLAIN
- 15%-25% SLOPES
- 25%+ SLOPES
- WETLANDS

SOILS LEGEND:

SYMBOL	SOIL NAME
Ba	EDGEMONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES
Co	COCORUS SILT LOAM (HORICULTURALLY SUITED SOILS)
GeB	GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES (HORICULTURALLY SUITED SOILS)
GdC	GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES (HORICULTURALLY SUITED SOILS)
GdF	GLADSTONE GRAVELLY LOAM, 8 TO 25 PERCENT SLOPES VERY BOULDERY
Ha	HATBORO SILT LOAM
MaD	MANOR SILT LOAM, 15 TO 25 PERCENT SLOPES
UrB	URBAN LAND GLADSTONE COMPLEX, 0 TO 8 PERCENT

EXISTING RESOURCES PLAN

SCALE: 1"=50'

50 0 25 50 100

GRAPHIC SCALE
1 inch = 50 feet

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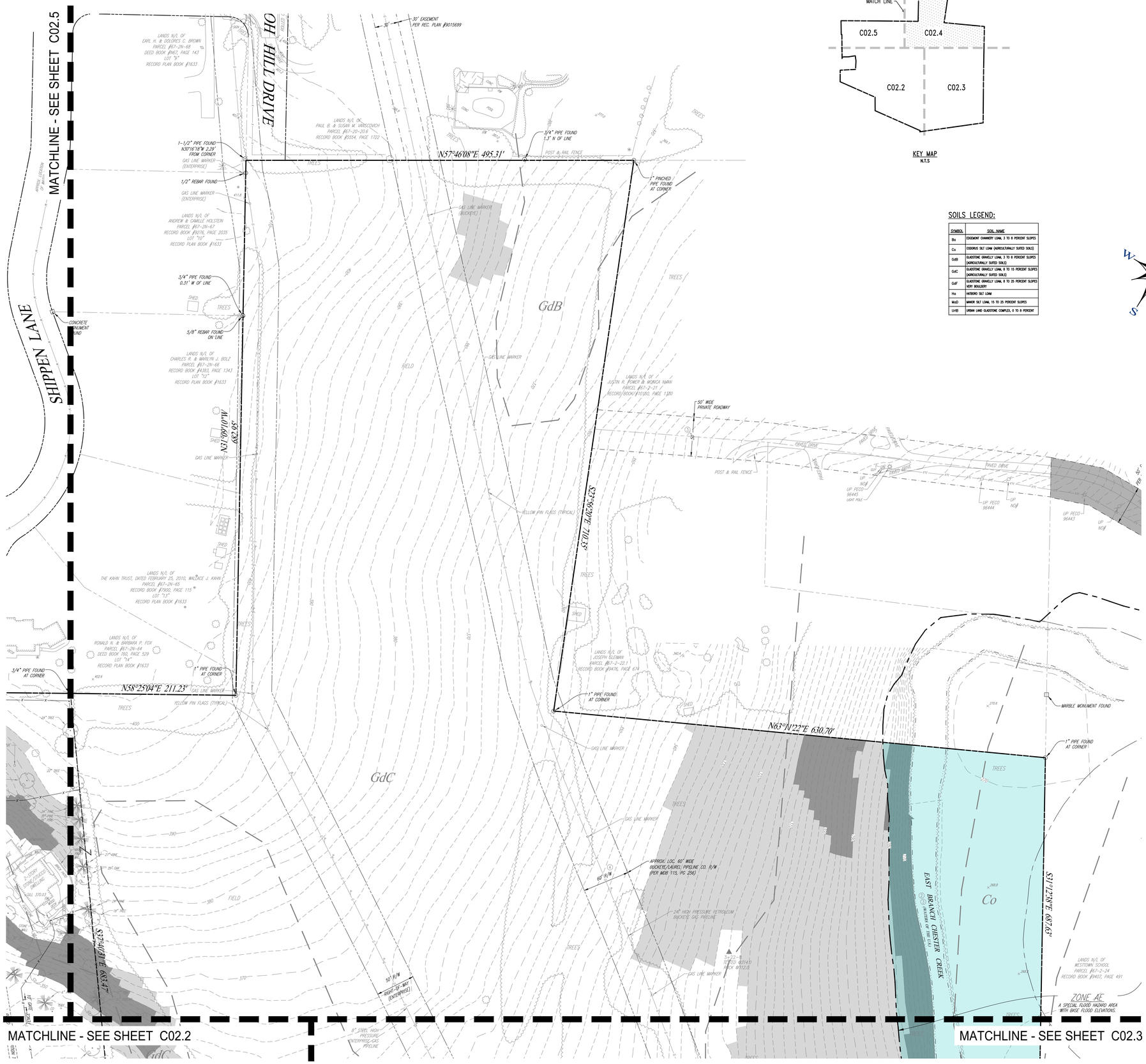
2		06/15/23	REVISED PER TOWNSHIP CONSULTANT
1	ADM	04/14/23	REVISIONS

CONDITIONAL USE
EXISTING RESOURCES PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	00 OVERALL EXISTING RESOURCES PLAN.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C02.3
SHEET	09 of 38



MATCH LINE

C02.5 | C02.4

C02.2 | C02.3

KEY MAP
N.T.S

SOILS LEGEND:

SYMBOL	SOIL NAME
Bo	EDGEMONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES
Co	CODORUS SILT LOAM (AGRICULTURALLY SUITED SOILS)
GdB	GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES (AGRICULTURALLY SUITED SOILS)
GdC	GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES (AGRICULTURALLY SUITED SOILS)
GdF	GLADSTONE GRAVELLY LOAM, 8 TO 25 PERCENT SLOPES, VERY BOULDERY
Ho	HATBORO SILT LOAM
MaD	MANOR SILT LOAM, 15 TO 25 PERCENT SLOPES
UrkB	URBAN LAND-GLADSTONE COMPLEX, 0 TO 8 PERCENT

N W E S

LEGEND

- EX. PROPERTY LINE
- PROP. PROPERTY LINE
- EX. RIGHT-OF-WAY
- PROP. RIGHT-OF-WAY
- EX. MONUMENT
- PROP. MONUMENT
- EX. IRON PIPE
- PROP. IRON PIPE
- EX. EASEMENT
- PROP. EASEMENT
- EX. WETLANDS
- 242 EXISTING CONTOUR
- PROPOSED CONTOUR
- X 123.00 EXISTING SPOT ELEV.
- x 123.00 NEW SPOT ELEV.
- GeB2 SOILS TYPE
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- WETLANDS

EXISTING RESOURCES PLAN
SCALE: 1"=50'

50 0 25 50 100
GRAPHIC SCALE
1 inch = 50 feet

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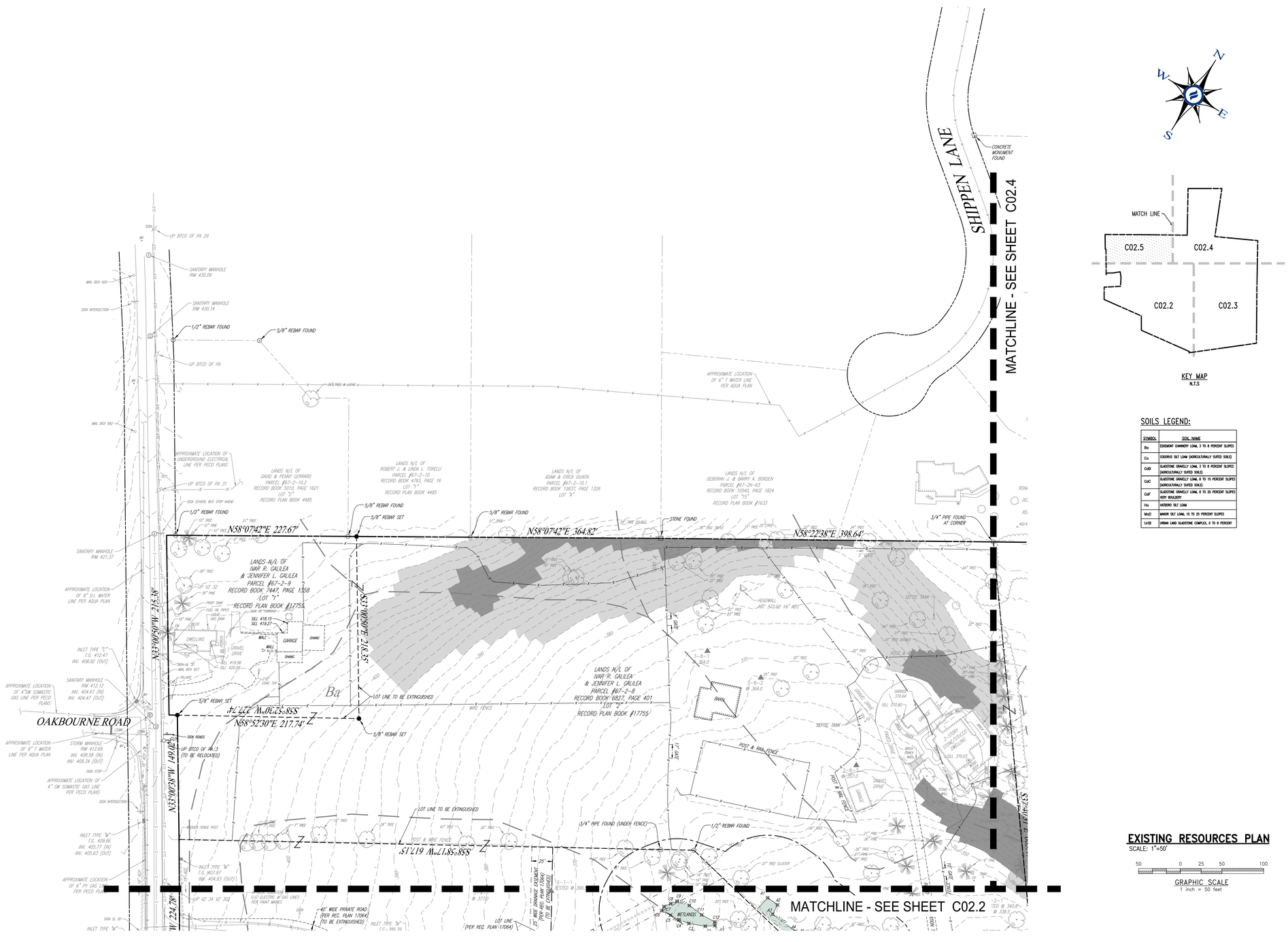
3		
2	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
1		

CONDITIONAL USE
EXISTING RESOURCES PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	CO_OVERALL EXISTING RESOURCES PLAN.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C02.4
SHEET	10 or 38



LEGEND

- EX. PROPERTY LINE
- PROP. PROPERTY LINE
- EX. RIGHT-OF-WAY
- PROP. RIGHT-OF-WAY
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- PROP. MONUMENT
- EX. IRON PIPE
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- PROP. EASEMENT
- EX. WETLANDS
- 242 EXISTING CONTOUR
- [242] PROPOSED CONTOUR
- x 123.00 EXISTING SPOT ELEV.
- x [123.00] NEW SPOT ELEV.
- GeB2 SOILS TYPE
- SOILS LINE
- EX. CONC. CURB
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- PROP. SANITARY MH. ID
- EX. WATER LINE
- PROP. WATER LINE
- PROP. WATER LATERAL
- PROP. FIRE WATER LINE
- EX. WATER VALVE
- PROP. WATER VALVE
- EX. HYDRANT
- PROP. HYDRANT
- EX. MANHOLE
- PROP. MANHOLE
- ZONE AE FLOODPLAIN
- 15%-25% SLOPES
- 25%+ SLOPES
- WETLANDS

KEY MAP
N.T.S

SOILS LEGEND:

SYMBOL	SOIL NAME
Ba	EXCMONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES
Co	COCORUS SILT LOAM (AGRICULTURALLY SUITED SOILS)
GeB	GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES (AGRICULTURALLY SUITED SOILS)
GeC	GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES (AGRICULTURALLY SUITED SOILS)
GeF	GLADSTONE GRAVELLY LOAM, 8 TO 25 PERCENT SLOPES VERY BOULDERY
Ho	HATBORO SILT LOAM
MaD	MANOR SILT LOAM, 15 TO 25 PERCENT SLOPES
UrB	URBAN LAND GLADSTONE COMPLEX, 0 TO 8 PERCENT

EXISTING RESOURCES PLAN

SCALE: 1"=50'

50 0 25 50 100

GRAPHIC SCALE
1 inch = 50 feet

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8		
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3		
2	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
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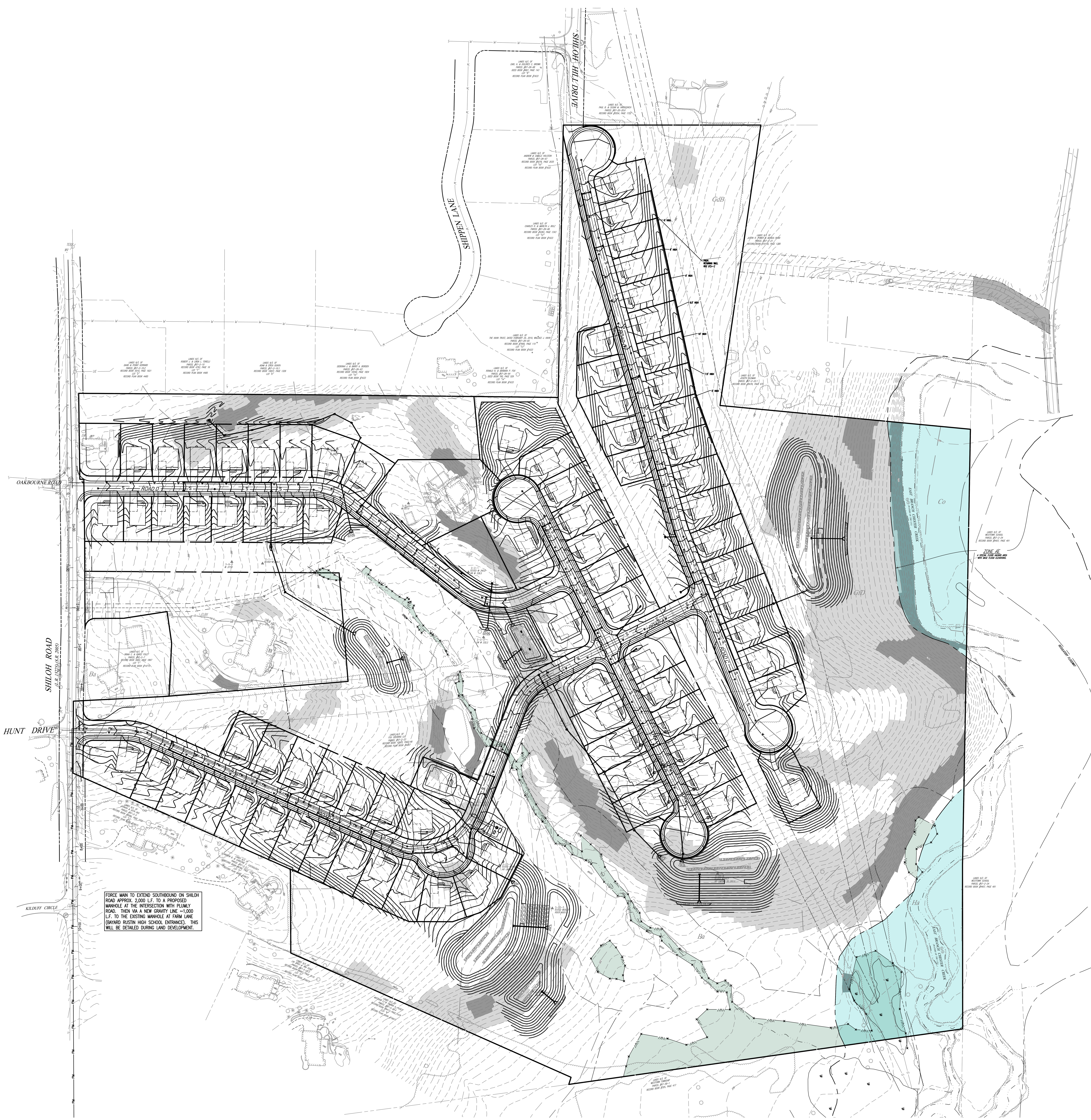
CONDITIONAL USE
EXISTING RESOURCES PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
DAD FILE: OA OVERALL EXISTING RESOURCES PLAN.dwg	
PLOTTED:	06/15/23
DRAWING NO.:	C02.5
SHEET	11 OF 38



FORCE MAIN TO EXTEND SOUTHBOUND ON SHILOH ROAD APPROX. 2,000 L.F. TO A PROPOSED MANHOLE AT THE INTERSECTION WITH PLUMLY ROAD. THEN VIA A NEW GRAVITY LINE ~1,000 L.F. TO THE EXISTING MANHOLE AT FARM LANE (BAYARD RUSTIN HIGH SCHOOL ENTRANCE). THIS WILL BE DETAILED DURING LAND DEVELOPMENT.

SOILS LEGEND:

SYMBOL	SOIL NAME
Ba	EDGEMONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES
Co	CODORUS SILT LOAM (AGRICULTURALLY SUITED SOILS)
GdB	GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES (AGRICULTURALLY SUITED SOILS)
GdC	GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES (AGRICULTURALLY SUITED SOILS)
GdF	GLADSTONE GRAVELLY LOAM, 8 TO 25 PERCENT SLOPES VERY BOULDERY
Ha	HATBORO SILT LOAM
MaD	MANOR SILT LOAM, 15 TO 25 PERCENT SLOPES
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LEGEND

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- EX. SIGN
- PROP. SIGN
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- (TBR) TO BE REMOVED
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- EX. GUY ANCHOR
- G EX. GAS LINE
- G PROP. GAS LINE
- G.V. EX. GAS VALVE
- G.V. PROP. GAS VALVE
- EX. STORM SEWER LINE
- PROP. STORM SEWER LINE
- EX. STORM INLET
- PROP. STORM INLET
- IC 1 PROP. STORM INLET ID
- PROP. SEEPAGE BED
- S EX. SANITARY SEWER LINE
- S PROP. SAN. SEWER LINE
- L PROP. SAN. SEWER LATERAL
- MH 1 PROP. SANITARY MH. ID
- W EX. WATER LINE
- W PROP. WATER LINE
- WL PROP. WATER LATERAL
- FW PROP. FIRE WATER LINE
- W.V. EX. WATER VALVE
- W.V. PROP. WATER VALVE
- F.H. EX. HYDRANT
- F.H. PROP. HYDRANT
- EX. MANHOLE
- PROP. MANHOLE
- ZONE AE FLOODPLAIN
- 15%-25% SLOPES
- 25%+ SLOPES
- WETLANDS

GRADING & UTILITY GENERAL NOTES:

1. PRIOR TO STARTING CONSTRUCTION, ALL UTILITY SERVICES IN THE AREA SHALL BE LOCATED AND MEASURES TAKEN TO PROTECT THE EXISTING FACILITIES. ANY DAMAGE TO EXISTING FACILITIES SHALL BE IMMEDIATELY AND COMPLETELY REPAIRED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.
2. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE UTILITY "ONE-CALL" NUMBER 72 HOURS PRIOR TO COMMENCING ANY CONSTRUCTION ACTIVITIES ON THIS SITE. CONTRACTOR SHALL ALSO NOTIFY LOCAL WATER AND SEWER DEPARTMENTS TO MARK OUT THEIR UTILITIES IF NECESSARY.
3. LOCATIONS OF EXISTING UTILITIES SHOWN HEREON HAVE BEEN DEVELOPED FROM FIELD SURVEY AND EXISTING RECORDS. COMPLETENESS AND ACCURACY OF EXISTING UTILITY INFORMATION IS NOT GUARANTEED. PRIOR TO THE START OF ANY CONSTRUCTION, THE CONTRACTOR SHALL ACCURATELY FIELD MEASURE LOCATION AND ELEVATION OF EXISTING UTILITIES AT POINTS OF CONNECTION AND POTENTIAL CONFLICT. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IN WRITING OF ANY DEVIATION FROM INFORMATION SHOWN ON THESE PLANS. CONSTRUCTION SHALL COMMENCE BEGINNING AT THE LOWEST INVERT (POINT OF CONNECTION) AND PROGRESS UP GRADIENT. INTERFACE POINTS (CROSSINGS) WITH EXISTING UNDERGROUND INSTALLATIONS SHALL BE FIELD VERIFIED BY TEST PIT PRIOR TO COMMENCEMENT OF CONSTRUCTION.
4. CONSTRUCTION SHALL BE LOCATED, AND MEASURES TAKEN TO PROTECT THE EXISTING FACILITIES IN ACCORDANCE WITH PENNSYLVANIA ACT 187. ANY DAMAGE TO EXISTING FACULTIES RESULTING FROM THE NEGLIGENCE OF THE CONTRACTOR SHALL BE IMMEDIATELY AND COMPLETELY REPAIRED AT THE CONTRACTOR'S EXPENSE.
5. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT ALL PERSONS, VEHICLES AND BUILDINGS WITHIN THE CONSTRUCTION AREAS FROM INJURY AND DAMAGE DURING THE COURSE OF WORK.
6. SITE GRADING SHALL BE PERFORMED IN ACCORDANCE WITH THESE PLANS AND SPECIFIC BUILDING PERMIT PLAN FOR EACH INDIVIDUAL LOT.
7. CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF EXISTING TOPOGRAPHIC INFORMATION PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION. CONTRACTOR TO ENSURE 1.0% MIN. SLOPE ON ASPHALT AND 2.0% MIN. ON GRASS, TO PREVENT PONDING. ANY DISCREPANCIES THAT MAY AFFECT THE PUBLIC SAFETY OR PROJECT COST, MUST BE IDENTIFIED TO THE ENGINEER IN WRITING IMMEDIATELY. PROCEEDING WITH CONSTRUCTION WITH DESIGN DISCREPANCIES IS DONE SO AT THE CONTRACTOR'S OWN RISK.
8. ALL SITE IMPROVEMENTS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE APPLICABLE LOCAL, COUNTY, STATE AND FEDERAL STATUTES AND REGULATIONS.
9. ALL TRENCHING, SHORING AND EXCAVATING OPERATIONS SHALL BE PERFORMED IN COMPLIANCE WITH THE REQUIREMENTS OF THE U.S. DEPARTMENT OF LABOR, OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).
10. SCALED DIMENSIONS FROM THIS PLAN SHALL NOT BE USED FOR CONSTRUCTION WITHOUT CONFIRMATION FROM D.L. HOWELL & ASSOC., INC.
11. SUBBASE MATERIAL FOR WALKS AND ASPHALT SHALL BE FREE OF ORGANICS AND OTHER UNSUITABLE MATERIALS. IF ANY UNSUITABLE SOIL IS ENCOUNTERED DURING EXCAVATION, THE CONTRACTOR SHALL REMOVE IT AND REPLACE TO THE RECOMMENDATIONS OUTLINED IN A GEOTECHNICAL EVALUATION PREPARED SPECIFICALLY FOR THIS SITE.
12. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE LOCAL AUTHORITY OR GOVERNING AGENCY OF THE BEGINNING DATE OF CONSTRUCTION AND TO ENSURE THAT NO WORK IS PERFORMED WITHOUT THE REQUIRED PERMITS AND INSPECTIONS BY THE LOCAL AUTHORITY OR GOVERNING AGENCY.
13. IF CONDITIONS ON THE GROUND DIFFER FROM THOSE SHOWN ON THE PLAN, THE CONTRACTOR SHALL NOTIFY IMMEDIATELY IN WRITING THE ENGINEER OF RECORD.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REQUIRED TRAFFIC CONTROL, SHEETING, SHORING AND BARRICADING OF OPEN EXCAVATIONS.
15. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND BE SOLELY RESPONSIBLE FOR AND HAVE CONTROL OVER CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES, SAFETY PRECAUTIONS, AND PROGRAMS IN CONNECTION WITH THE WORK AND FOR COORDINATION OF ALL PORTIONS OF THE WORK UNDER CONTRACT.
16. CONTRACTOR SHALL REVIEW VARIOUS PHASES OF WORK WITH THE OWNER TO DETERMINE WHETHER ANY PHASE WILL CONFLICT WITH THE OWNERS DAILY OPERATIONS. WHERE CONFLICT IS APPARENT THE CONTRACTOR SHALL COORDINATE WITH THE OWNER THE WORK TO BE PERFORMED SO AS TO BE THE LEAST DISRUPTIVE.
17. ANY PAVING DAMAGED DURING CONSTRUCTION ACTIVITIES SHALL BE REMOVED TO SUBGRADE AND REPLACED WITH THE PAVING SECTION AT THE CONTRACTOR'S EXPENSE, AND SHALL MATCH THE EXISTING PAVING SECTION.
18. THE PAVED AREAS WITHIN THE RIGHT-OF-WAY, THAT ARE DISTURBED DURING LATERAL INSTALLATION, SHALL BE MILLED AND OVERLAID WITH WEARING COURSE.
19. IN ANY AREA SUBJECT TO VEHICULAR ACTIVITY DURING CONSTRUCTION, A MINIMUM OF 18 INCHES OF COVER SHALL BE MAINTAINED FOR ALL UNDERGROUND UTILITIES (STORMWATER, SANITARY SEWER, WATER, ELECTRIC, GAS, ETC.)
20. ALL FILL SHALL BE COMPACTED TO PROVIDE STABILITY OF MATERIAL AND TO PREVENT UNDESIRABLE SETTLEMENTS. THE FILL SHALL BE SPREAD IN A SERIES OF LAYERS, NOT EXCEEDING EIGHT INCHES IN THICKNESS, AND BE COMPACTED BY A SHEEPSFOOT ROLLER OR OTHER APPROVED METHOD AFTER EACH LAYER IS SPREAD. THE TOWNSHIP ENGINEER MAY REQUIRE COMPACTION TESTS AND REPORTS.
21. ALL STORM SEWER SHALL BE INSTALLED IN ACCORDANCE WITH WESTTOWN TOWNSHIP STANDARDS AND PENNDOT PUBLICATION 408 SPECIFICATIONS.
22. ALL OTHER UTILITY LINES, INCLUDING, BUT NOT LIMITED TO, ELECTRIC, GAS, STREETLIGHT SUPPLY, CABLE TELEVISION, AND TELEPHONE, SHALL BE PLACED UNDERGROUND. INSTALLATION OF UTILITIES SHALL BE IN STRICT ACCORDANCE WITH THE ENGINEERING STANDARDS AND SPECIFICATIONS OF THE TOWNSHIP OR PUBLIC UTILITY CONCERNED. UNDERGROUND UTILITIES SHALL BE PUT IN PLACE, CONNECTED, AND APPROVED BEFORE THE STREETS ARE CONSTRUCTED WHERE SUCH UTILITIES LIE UNDER THE PROPOSED CARTWAY AND BEFORE ANY PERSON IS PERMITTED TO OCCUPY ANY BUILDING SERVED BY SUCH FACILITIES.
23. THE STORMWATER MANAGEMENT SYSTEMS HAVE BEEN DESIGNED ASSUMING 4,500 SF OF IMPERVIOUS COVER FOR EACH LOT. IF FUTURE IMPERVIOUS IS ADDED, IT MUST BE DIRECTED TO THE STORMWATER MANAGEMENT SYSTEM, OR OTHER PROVISIONS MUST BE ADDED.
24. A MINIMUM 18" VERTICAL CLEARANCE SHOULD BE PROVIDED WHERE ANY AND ALL PLACES WHERE THE SEWER LATERALS AND WATER MAIN CROSS. A MINIMUM 18" VERTICAL CLEARANCE SHOULD ALSO BE PROVIDED WHERE THE SEWER LATERALS AND WATER SERVICE PIPING CROSS ALL STORM SEWERS.
25. WHEREVER POSSIBLE, WATER SERVICE PIPING SHOULD CROSS ABOVE SANITARY OR STORM SEWER PIPING WITH THE MINIMUM 18" VERTICAL CLEARANCE. A CONCRETE ENCASEMENT MUST BE UTILIZED WHEREVER THE 18" VERTICAL CLEARANCE CANNOT BE PROVIDED.
26. A 10' MINIMUM HORIZONTAL SEPARATION DISTANCE AND A 18" MINIMUM VERTICAL VERTICAL SEPARATION DISTANCE SHALL BE PROVIDED BETWEEN THE GRAVITY SANITARY SEWERS AND WATER MAINS. A CONCRETE ENCASEMENT MUST BE UTILIZED WHEREVER THE 18" VERTICAL CLEARANCE CANNOT BE PROVIDED.
27. THE GRADE OF THE DRIVEWAY WITHIN 20 FEET OF THE PAVEMENT EDGE OR THE CURBLINE OF THE PUBLIC ROAD, TOWNSHIP OR STATE, SHALL NOT EXCEED 4%.
28. THE SUBGRADE WITHIN THE LIMITS OF THE PROPOSED CARTWAY SHALL BE SHAPED TO CONFORM TO THE LINE, GRADE AND CROSS-SECTION OF THE PROPOSED CARTWAY AND SHALL BE THOROUGHLY COMPACTED AS PER PENNDOT PUBLICATION 408. SUBGRADE SHALL BE SLOPED TO CORRESPOND TO THE SLOPE OF THE FINISHED ROAD SURFACE. BEFORE PLACING THE BASE COURSE, THE SUBGRADE SHALL BE DRESSED WITH ONE INCH OF FINE AGGREGATE.

OVERALL GRADING FEASIBILITY PLAN

SCALE: 1"=100'

GRAPHIC SCALE (100, 0, 50, 100, 200)
1 inch = 100 feet

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West Chester, PA 19380
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REV.	DATE	DESCRIPTION
1	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
2		
3		
4		
5		
6		
7		
8		

CONDITIONAL USE
OVERALL GRADING FEASIBILITY PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=100'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	10 OVERALL GRADING FEASIBILITY PLAN.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C03.1
SHEET	12 OF 38

Q:\CIVIL 3D JOBS\3868\3868 PRODUCTION PLANS\SHEET SET\CONDITIONAL USE\10 OVERALL GRADING FEASIBILITY PLAN.DWG

MATCHLINE - SEE SHEET C03.5

MATCHLINE - SEE SHEET C03.4

MATCHLINE - SEE SHEET C03.3

SHILOH ROAD
(LR 15231)(R.R. 2805)

HUNT DRIVE

KILDUFF CIRCLE

ROAD A

INFILTRATION BASIN #4
ELEV. 344.00

UG BED 1 w/BASIN
ELEV. 336.00

FORCE MAIN TO EXTEND SOUTHBOUND ON SHILOH ROAD APPROX. 2,000 L.F. TO A PROPOSED MANHOLE AT THE INTERSECTION WITH PLUMLY ROAD. THEN VIA A NEW GRAVITY LINE ~1,000 L.F. TO THE EXISTING MANHOLE AT FARM LANE (BAYARD RUSTIN HIGH SCHOOL ENTRANCE). THIS WILL BE DETAILED DURING LAND DEVELOPMENT.

SOILS LEGEND:

SYMBOL	SOIL NAME
Ba	CODORUS SILT LOAM (HYDRIC SOILS)
Ce	CHANDLER LOAM, 3 TO 8 PERCENT SLOPES
GdB	GLADSTONE GRAVELLY LOAM, 3 TO 8 PERCENT SLOPES (AGRICULTURALLY SUITED SOILS)
GdC	GLADSTONE GRAVELLY LOAM, 8 TO 15 PERCENT SLOPES (AGRICULTURALLY SUITED SOILS)
GdF	GLADSTONE GRAVELLY LOAM, 8 TO 25 PERCENT SLOPES VERY BOULDERY
Ho	HATBORO SILT LOAM
MoD	MANOR SILT LOAM, 15 TO 25 PERCENT SLOPES
UrhB	URBAN LAND GLADSTONE COMPLEX, 0 TO 8 PERCENT

LEGEND

- EX. PROPERTY LINE
- PROP. PROPERTY LINE
- EX. RIGHT-OF-WAY
- PROP. RIGHT-OF-WAY
- EX. MONUMENT
- PROP. MONUMENT
- EX. IRON PIPE
- PROP. IRON PIPE
- EX. EASEMENT
- PROP. EASEMENT
- EX. WETLANDS
- 242 EXISTING CONTOUR
- [242] PROPOSED CONTOUR
- x 123.00 EXISTING SPOT ELEV.
- x [123.00] NEW SPOT ELEV.
- GeB2 SOILS TYPE
- SOILS LINE
- EX. CONC. CURB
- PROP. CONC. CURB
- EX. EDGE OF PAVING
- PROP. EDGE OF PAVING
- EX. LIGHT POLE
- PROP. LIGHT POLE
- EX. FENCE
- EX. MAIL BOX
- EX. SIGN
- PROP. SIGN
- EXIST. PARKING SPACES
- PROP. PARKING SPACES
- (TBR) TO BE REMOVED
- EX. TELE. LINE
- T PROP. TELE. LINE
- EX. ELEC. LINE
- E PROP. ELEC. LINE
- EX. UTILITY POLE
- PROP. UTILITY POLE
- EX. GUY ANCHOR
- EX. GAS LINE
- G PROP. GAS LINE
- EX. GAS VALVE
- G.V. PROP. GAS VALVE
- EX. STORM SEWER LINE
- PROP. STORM SEWER LINE
- EX. STORM INLET
- PROP. STORM INLET
- PROP. STORM INLET ID
- PROP. SEEPAGE BED
- EX. SANITARY SEWER LINE
- S PROP. SAN. SEWER LINE
- L PROP. SAN. SEWER LATERAL
- MH 1 PROP. SANITARY MH. ID
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- F.H. PROP. HYDRANT
- EX. MANHOLE
- PROP. MANHOLE
- ZONE AE FLOODPLAIN
- 15%-25% SLOPES
- 25%+ SLOPES
- WETLANDS

KEY MAP
N.T.S

MATCH LINE
C03.5 C03.4
C03.2 C03.3

GRADING FEASIBILITY PLAN
SCALE: 1"=50'

50 0 25 50 100
GRAPHIC SCALE
1 inch = 50 feet

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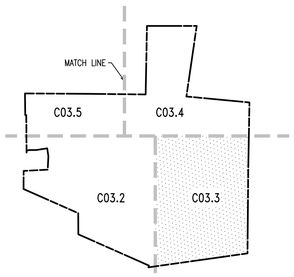
2	REVISED PER TOWNSHIP CONSULTANT REVIEWS	06/15/23

CONDITIONAL USE
GRADING FEASIBILITY PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	10 OVERALL GRADING FEASIBILITY PLAN.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C03.2
SHEET	13 or 38



KEY MAP
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GRADING FEASIBILITY PLAN
SCALE: 1"=50'

50 0 25 50 100
GRAPHIC SCALE
1 inch = 50 feet

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CONDITIONAL USE
GRADING FEASIBILITY PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE/ DESCRIPTION:	C:\OVERALL GRADING FEASIBILITY PLAN.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C03.3
SHEET	14 of 38

MATCHLINE - SEE SHEET C03.5

SHILOH HILL DRIVE

SHIPPEN LANE

LANDS N/L OF
EARL H. & DOLORES C. BROWN
PARCEL #67-2N-68
DEED BOOK #967, PAGE 143
LOT "3"
RECORD PLAN BOOK #1633

LANDS N/L OF
PAUL B. & SUSAN M. VARSOVICH
PARCEL #67-2D-20.6
RECORD BOOK #5554, PAGE 1722

LANDS N/L OF
ANDREW & CAMILLE HOLSTEIN
PARCEL #67-2N-67
RECORD BOOK #3076, PAGE 2035
LOT "10"
RECORD PLAN BOOK #1633

LANDS N/L OF
CHARLES R. & MARILYN J. BOLZ
PARCEL #67-2N-66
RECORD BOOK #4861, PAGE 1343
LOT "12"
RECORD PLAN BOOK #1633

LANDS N/L OF
THE KAHN TRUST, DATED FEBRUARY 25, 2019, WALTER J. KAHN
PARCEL #67-2N-65
RECORD BOOK #3900, PAGE 115
LOT "13"
RECORD PLAN BOOK #1633

LANDS N/L OF
RONALD N. & BARBARA P. FOX
PARCEL #67-2N-64
DEED BOOK 160, PAGE 529
LOT "14"
RECORD PLAN BOOK #1633

LANDS N/L OF
JUSTIN R. POWER & MONICA NAAN
PARCEL #67-2-21
RECORD BOOK #10160, PAGE 1320

LANDS N/L OF
JOSEPH ELEMAN
PARCEL #67-2-22.1
RECORD BOOK #4470, PAGE 674

LANDS N/L OF
WESTTOWN SCHOOL
PARCEL #67-2-24
RECORD BOOK #4407, PAGE 491

30' EASEMENT
PER REC. PLAN #9015699

50' WIDE
PRIVATE ROADWAY

PROP. RETAINING WALL
652 LF(+-)

6' HIGH

8.5' HIGH

10' HIGH

7.5' HIGH

5' HIGH

ROAD A

ROAD B

ROAD C

YELLOW PIN FLAGS (TYPICAL)

GAS LINE MARKER

POST & RAIL FENCE

TREES

GdB

Co

EAST BRANCH CHESTER CREEK
(WATERS OF THE U.S.)

ZONE AE
A SPECIAL FLOOD HAZARD AREA
WITH BASE FLOOD ELEVATIONS.

50' R/W
RIGHT-OF-WAY
(ENTERPRISE)

60' R/W

MATCHLINE - SEE SHEET C03.2

MATCHLINE - SEE SHEET C03.3

MATCH LINE

KEY MAP
N.T.S

C03.5 | C03.4 | C03.2 | C03.3

SOILS LEGEND:

SYMBOL	SOIL NAME
Bo	EDGEMONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES
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GRADING FEASIBILITY PLAN

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CONDITIONAL USE
GRADING FEASIBILITY PLAN

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PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
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CAD FILE: (C:\OVERALL GRADING FEASIBILITY PLAN.dwg	
PLOTTED:	06/15/23
DRAWING NO.:	C03.4
SHEET	15 or 38

SOILS LEGEND:

SYMBOL	SOIL NAME
Ba	EDGEMONT CHANNERY LOAM, 3 TO 8 PERCENT SLOPES
Co	CODORUS SILT LOAM (AGRICULTURALLY SUITED SOILS)
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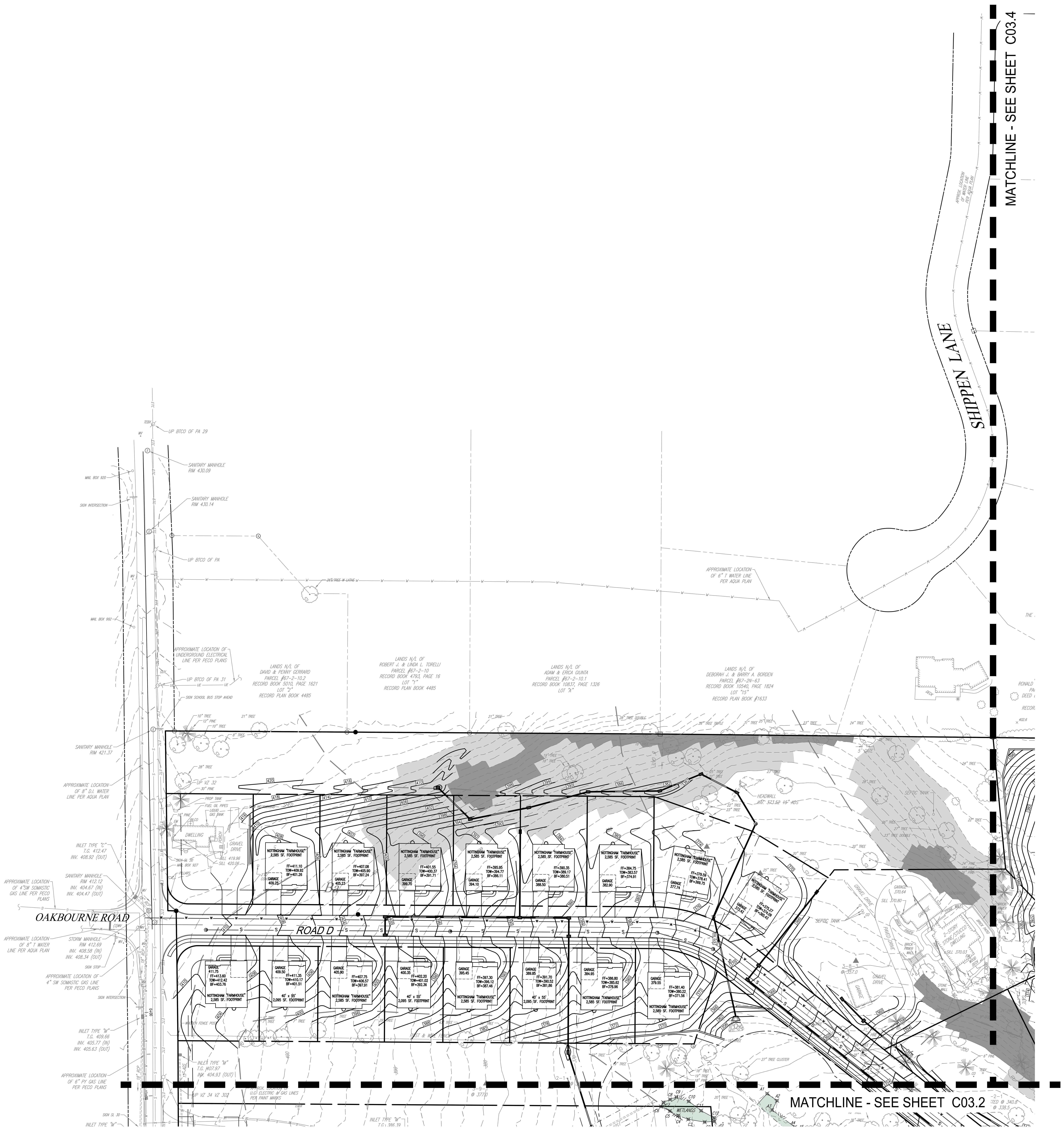
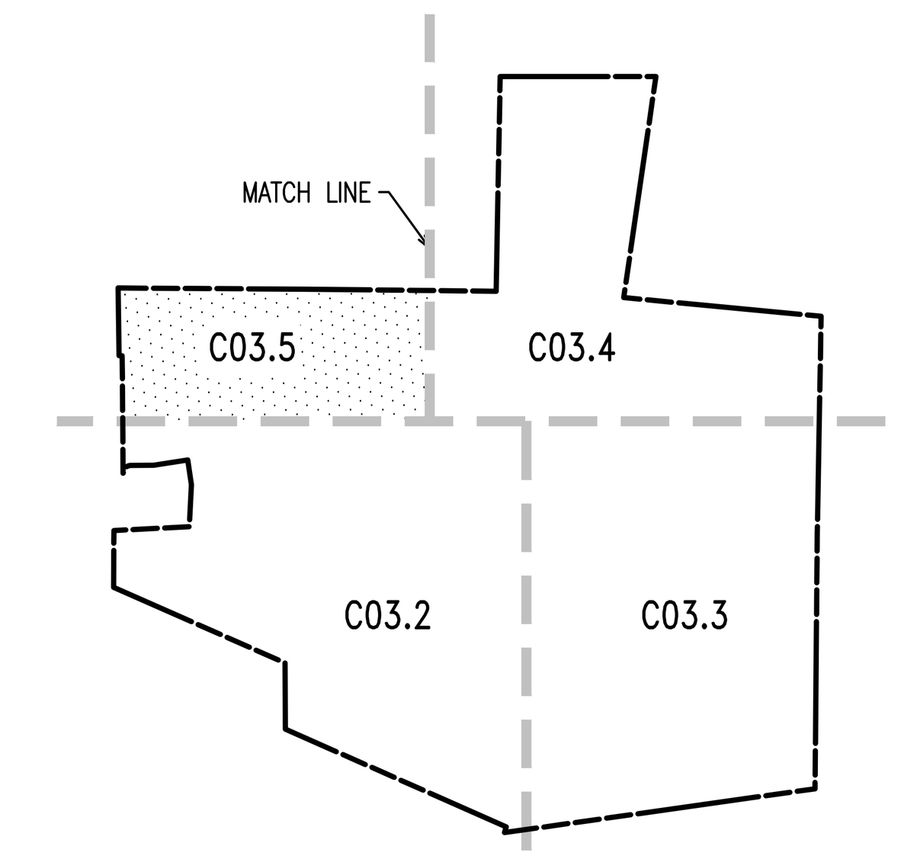
PROP. SIGN
4 EXIST. PARKING SPACES
4 PROP. PARKING SPACES
(TBR) TO BE REMOVED
T EX. TELE. LINE
T PROP. TELE. LINE
E EX. ELEC. LINE
E PROP. ELEC. LINE
EX. UTILITY POLE
PROP. UTILITY POLE
EX. GUY ANCHOR
G EX. GAS LINE
G PROP. GAS LINE
G.V. EX. GAS VALVE
G.V. PROP. GAS VALVE
EX. STORM SEWER LINE
PROP. STORM SEWER LINE
EX. STORM INLET
PROP. STORM INLET
IC 1 PROP. STORM INLET ID
PROP. SEEPAGE BED
S EX. SANITARY SEWER LINE
S PROP. SAN. SEWER LINE
L PROP. SAN. SEWER LATERAL
MH 1 PROP. SANITARY MH. ID
W EX. WATER LINE
W PROP. WATER LINE
WL PROP. WATER LATERAL
FW PROP. FIRE WATER LINE
W.V. EX. WATER VALVE
W.V. PROP. WATER VALVE
F.H. EX. HYDRANT
F.H. PROP. HYDRANT
EX. MANHOLE
PROP. MANHOLE
ZONE AE FLOODPLAIN
15%-25% SLOPES
25%+ SLOPES
WETLANDS





KEY MAP
N.T.S

GRADING FEASIBILITY PLAN

SCALE: 1"=50'

50 0 25 50 100

GRAPHIC SCALE
1 inch = 50 feet

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REV.	DATE	DESCRIPTION
1	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
2		
3		
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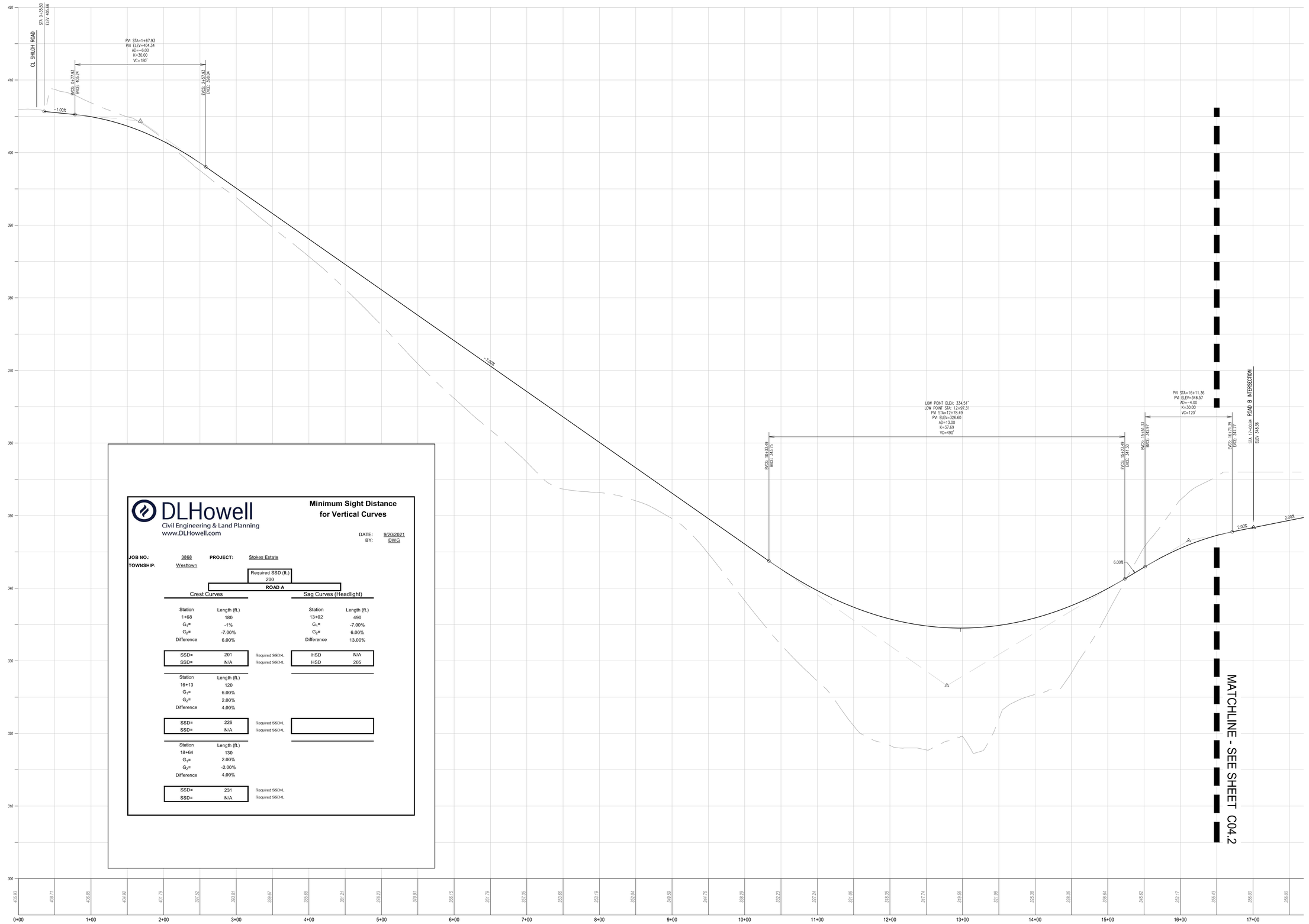
CONDITIONAL USE
GRADING FEASIBILITY PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	10 OVERALL GRADING FEASIBILITY PLAN.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C03.5
SHEET	16 of 38



ROAD A PROFILE
HORIZ SCALE: 1"=50'
VERT SCALE: 1"=5'

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Minimum Sight Distance for Vertical Curves

DATE: 9/20/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate
TOWNSHIP: Westtown

Required SSD (ft.)
200
ROAD A

Crest Curves			Sag Curves (Headlight)	
Station	Length (ft.)		Station	Length (ft.)
1+68	180		13+02	490
G_1=	-1%		G_2=	-7.00%
G_2=	-7.00%		G_3=	6.00%
Difference	6.00%		Difference	13.00%
SSD=	201	Required SSD>L	HSD	N/A
SSD=	N/A	Required SSD<L	HSD	205
Station	Length (ft.)			
16+13	129			
G_1=	6.00%			
G_2=	2.00%			
Difference	4.00%			
SSD=	226	Required SSD>L		
SSD=	N/A	Required SSD<L		
Station	Length (ft.)			
18+64	130			
G_1=	2.00%			
G_2=	-2.00%			
Difference	4.00%			
SSD=	231	Required SSD>L		
SSD=	N/A	Required SSD<L		

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REV.	DATE	DESCRIPTION
8		
7		
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5		
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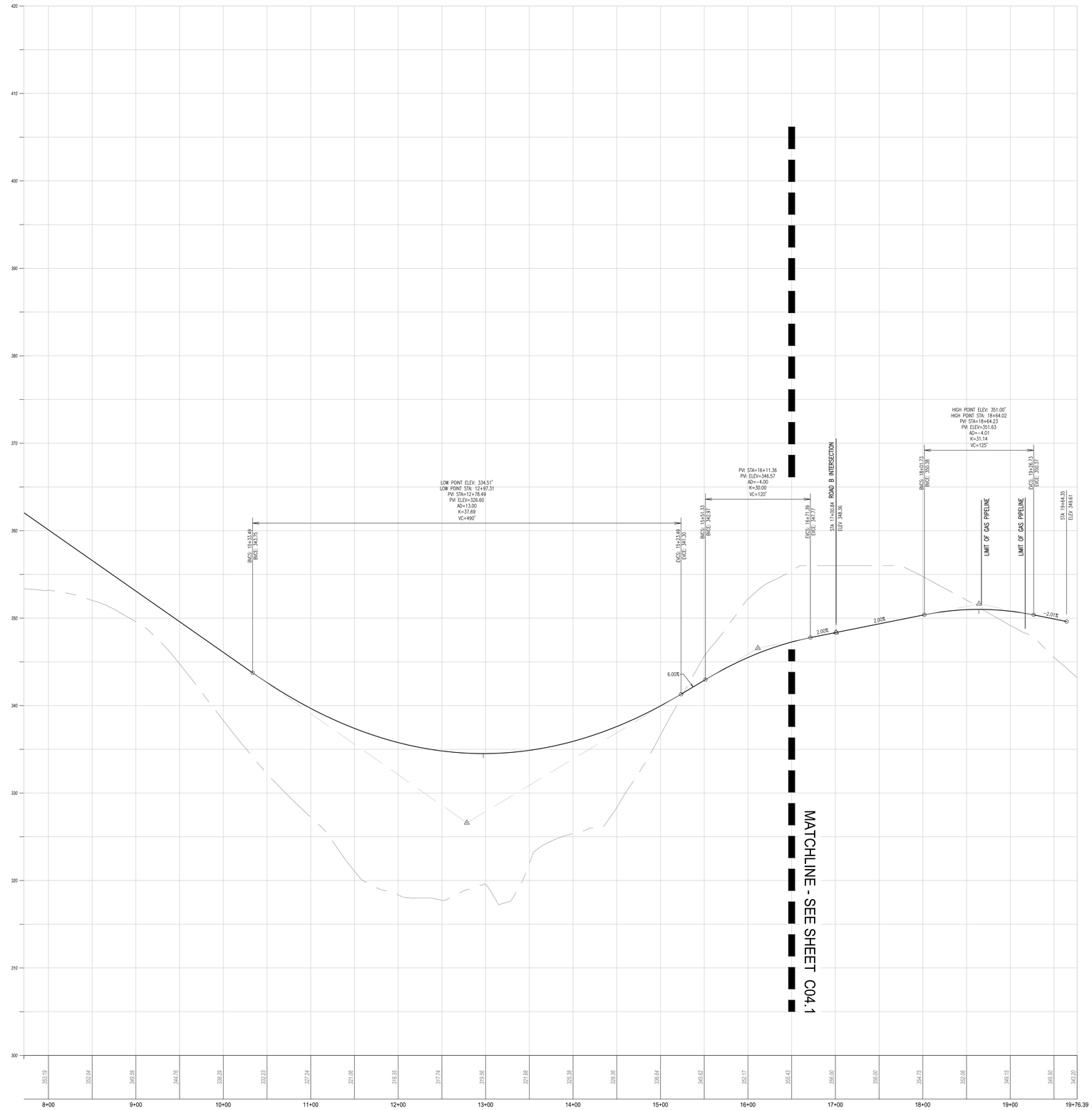
2	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
1		

CONDITIONAL USE
PROFILES

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	14 PROFILES.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C04.1
SHEET	17 OF 38



ROAD A PROFILE
HORIZ SCALE: 1"=50'
VERT SCALE: 1"=5'

Minimum Sight Distance for Vertical Curves

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DATE: 9/20/2021
BY: DWG

JOB NO.: 3868 PROJECT: Stokes Estate
TOWNSHIP: Westtown

Required SSD (ft.)
200
ROAD A

Crest Curves			Sag Curves (Headlight)	
Station	Length (ft.)		Station	Length (ft.)
1+68	180		13+02	490
G_1=	-1%		G_1=	-7.00%
G_2=	-7.00%		G_2=	6.00%
Difference	6.00%		Difference	13.00%
SSD=	201	Required SSD>L	HSD	N/A
SSD=	N/A	Required SSD<L	HSD	205
Station	Length (ft.)			
16+13	120			
G_1=	6.00%			
G_2=	2.00%			
Difference	4.00%			
SSD=	226	Required SSD>L		
SSD=	N/A	Required SSD<L		
Station	Length (ft.)			
18+64	130			
G_1=	2.00%			
G_2=	-2.00%			
Difference	4.00%			
SSD=	231	Required SSD>L		
SSD=	N/A	Required SSD<L		

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2	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
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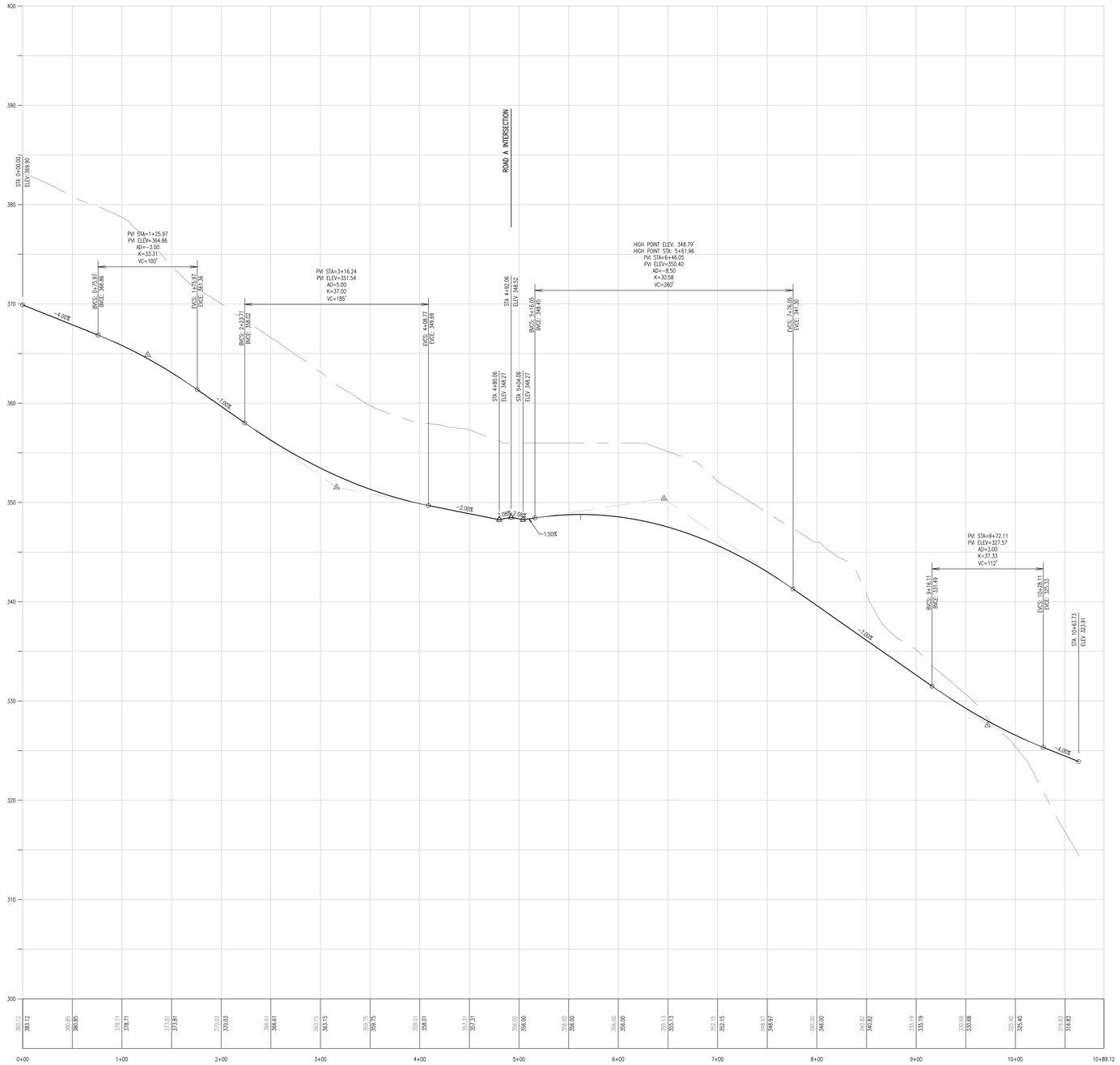
CONDITIONAL USE
PROFILES

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	14 PROFILES.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C04.2
SHEET	18 OF 38

G:\Civil_30 JOBS\3868\3868 PRODUCTION PLANS\SHEET SET\CONDITIONAL USE\14 PROFILES.DWG



ROAD B PROFILE STA 0+00 - 10+89.12
HORIZ SCALE: 1"=50'
VERT SCALE: 1"=5'

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Minimum Sight Distance for Vertical Curves

DATE: 9/20/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate
TOWNSHIP: Westtown

Required SSD (ft.)
200
ROAD B

Crest Curves			Sag Curves (Headlight)	
Station	Length (ft.)		Station	Length (ft.)
1+20	100		3+12	185
G_1=	-4.00%		G_1=	-7.00%
G_2=	-7.00%		G_2=	-2.00%
Difference	3.00%		Difference	5.00%
SSD=	272	Required SSD>L	HSD	204
SSD=	N/A	Required SSD<L	HSD	N/A
Station	Length (ft.)		Station	Length (ft.)
6+38	260		9+72	112
G_1=	1.50%		G_1=	-7.00%
G_2=	-7.00%		G_2=	-4.00%
Difference	8.50%		Difference	3.00%
SSD=	N/A	Required SSD>L	HSD	294
SSD=	202	Required SSD<L	HSD	N/A

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REV.	DATE	DESCRIPTION
1	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
2		
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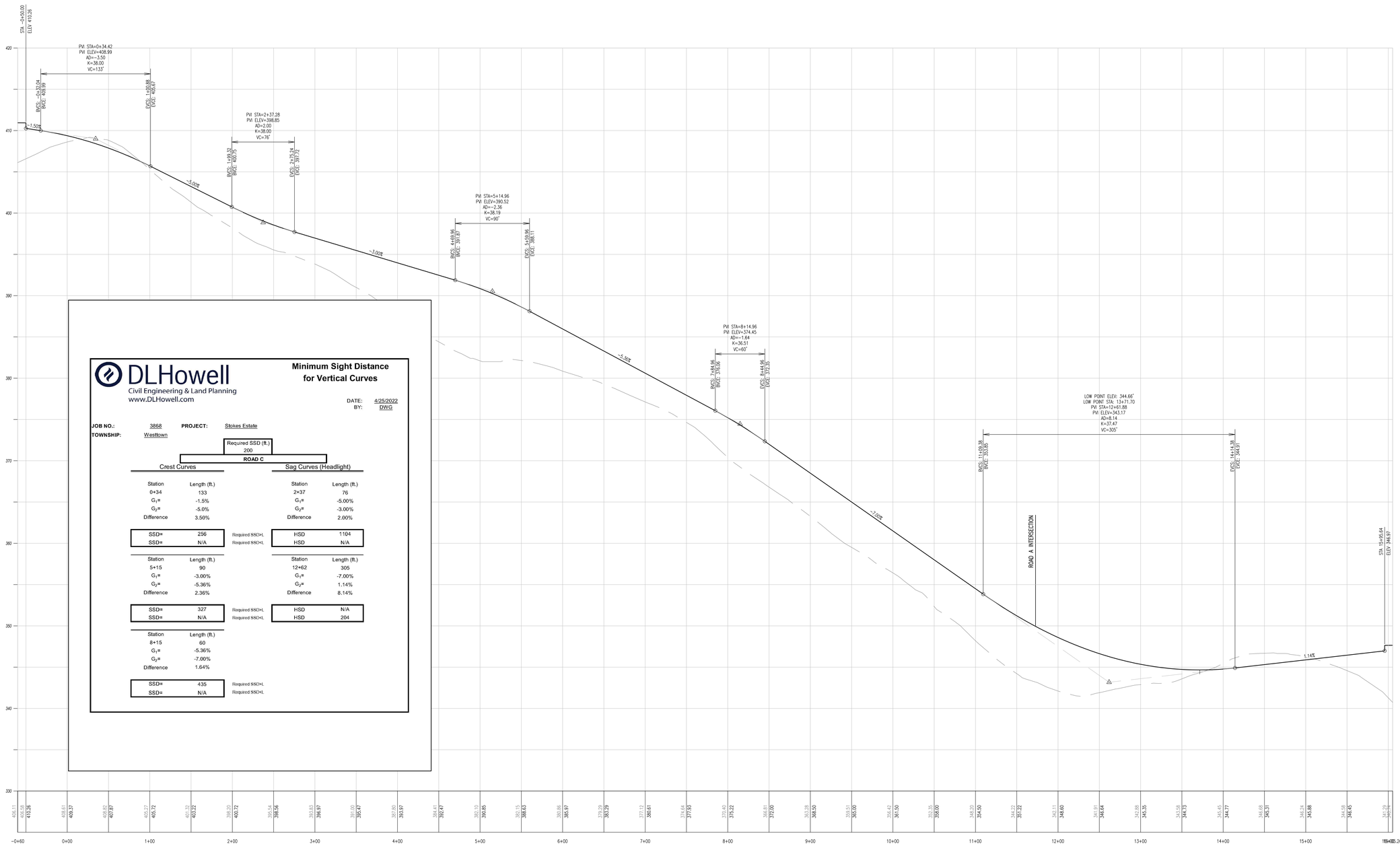
CONDITIONAL USE
PROFILES

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	14 PROFILES.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C04.3
SHEET	19 of 38



ROAD C PROFILE
HORIZ SCALE: 1"=50'
VERT SCALE: 1"=5'

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Minimum Sight Distance for Vertical Curves

DATE: 4/25/2022
BY: DWG

JOB NO.: 3868 PROJECT: Stokes Estate
TOWNSHIP: Westtown

Required SSD (ft.)
200
ROAD C

Crest Curves			Sag Curves (Headlight)	
Station	Length (ft.)		Station	Length (ft.)
0+34	133		2+37	76
G_1=	-1.5%		G_1=	-5.00%
G_2=	-5.0%		G_2=	-3.00%
Difference	3.50%		Difference	2.00%
SSD=	256	Required SSD=L	HSD	1104
SSD=	N/A	Required SSD=L	HSD	N/A
Station	Length (ft.)		Station	Length (ft.)
5+15	90		12+62	305
G_1=	-3.00%		G_1=	-7.00%
G_2=	-5.36%		G_2=	1.14%
Difference	2.36%		Difference	8.14%
SSD=	327	Required SSD=L	HSD	N/A
SSD=	N/A	Required SSD=L	HSD	204
Station	Length (ft.)			
8+15	60			
G_1=	-5.36%			
G_2=	-7.00%			
Difference	1.64%			
SSD=	435	Required SSD=L		
SSD=	N/A	Required SSD=L		

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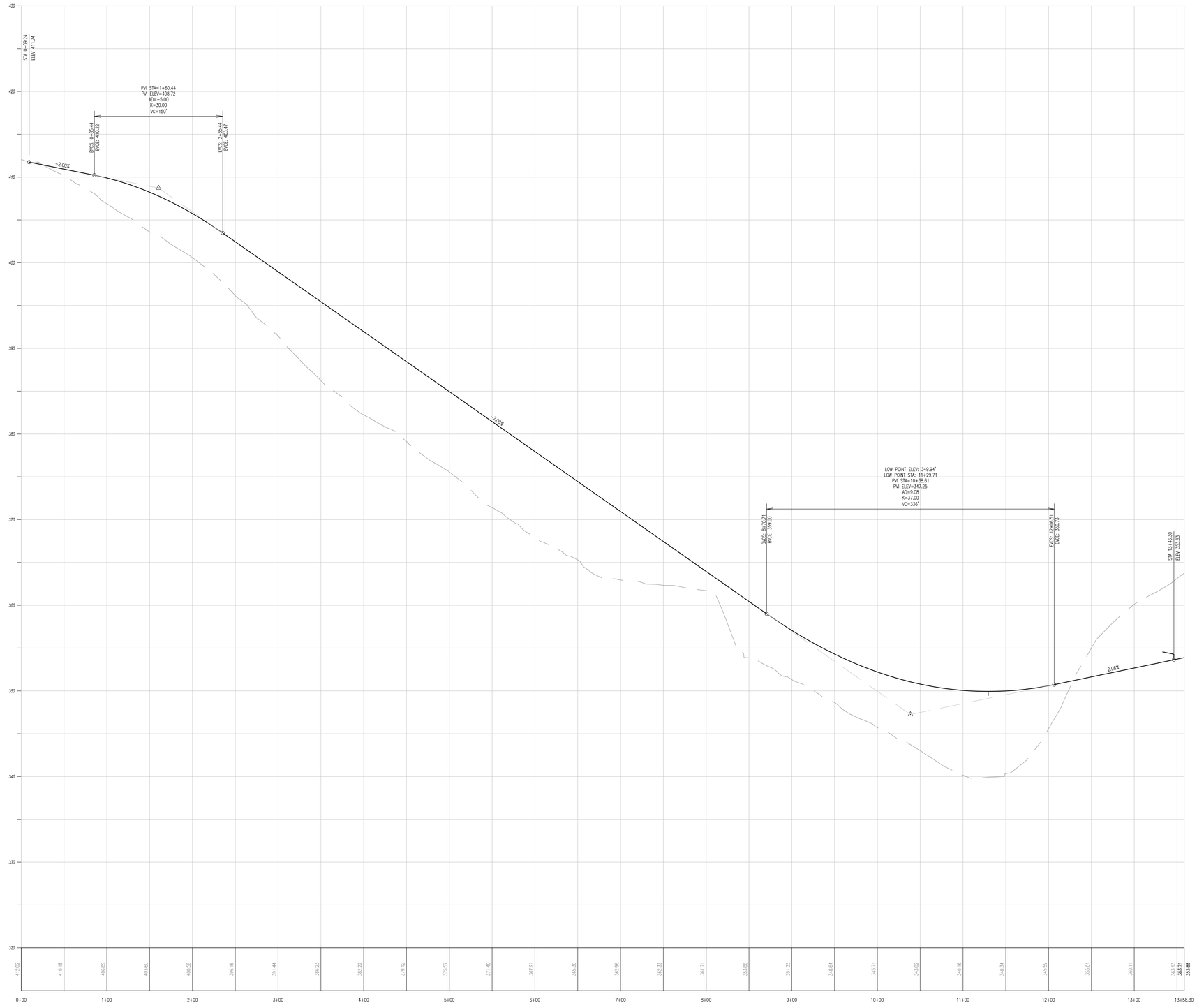
2	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
1		

CONDITIONAL USE
PROFILES

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	14 PROFILES.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C04.4
SHEET	20 OF 38



ROAD D PROFILE
HORIZ SCALE: 1"=50'
VERT SCALE: 1"=5'

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Minimum Sight Distance for Vertical Curves

DATE: 6/15/2023
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate
TOWNSHIP: Westtown

Required SSD (ft.)
200
ROAD D

Crest Curves			Sag Curves (Headlight)	
Station	Length (ft.)		Station	Length (ft.)
0+34	150		10+38	336
G_1=	-2.0%		G_1=	-7.00%
G_2=	-7.0%		G_2=	2.08%
Difference	5.00%		Difference	9.08%
SSD=	208	Required SSD<L	HSD	N/A
SSD=	N/A	Required SSD<L	HSD	203

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1	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
2		
3		
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6		
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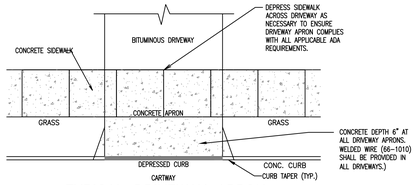
8		

CONDITIONAL USE
PROFILES

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	14 PROFILES.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C04.5
SHEET	21 of 38



TYPICAL DRIVEWAY APRON
NO SCALE

D	L	W	A
15"	3.5'	3.0'	12"
18"	4.0'	3.0'	12"
21"	4.5'	3.0'	12"
24"	5.0'	3.5'	12"
30"	5.5'	4.0'	12"
36"	5.8'	4.6'	12"
42"	6.3'	5.8'	12"
48"	6.9'	6.9'	12"
54"	7.5'	8.0'	12"
60"	8.1'	9.0'	15"
72"	9.2'	11.5'	15"

NOTES:

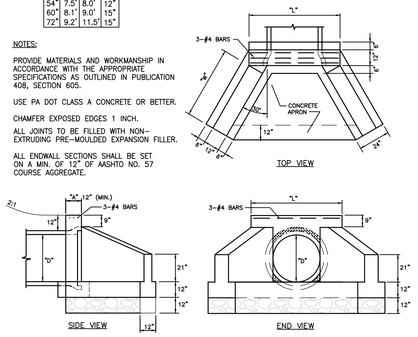
PROVIDE MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE APPROPRIATE SPECIFICATIONS AS OUTLINED IN PUBLICATION 408, SECTION 605.

USE PA DOT CLASS A CONCRETE OR BETTER.

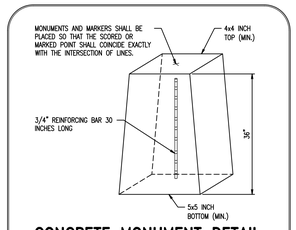
CHAMFER EXPOSED EDGES 1 INCH.

ALL JOINTS TO BE FILLED WITH NON-EXTRUDING PRE-MOULDED EXPANSION FILLER.

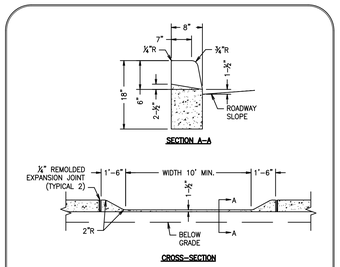
ALL ENDWALL SECTIONS SHALL BE SET ON A MIN. OF 12" OF AASHTO NO. 57 COURSE AGGREGATE.



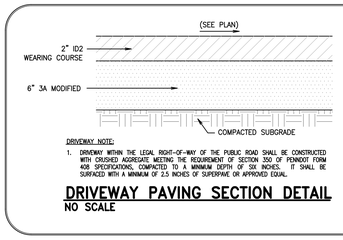
TYPE D-W ENDWALL
NO SCALE



CONCRETE MONUMENT DETAIL
NO SCALE



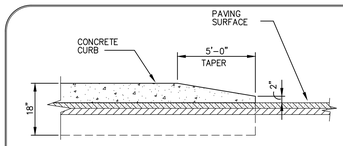
DRIVEWAY CURB CUT DETAILS
NO SCALE



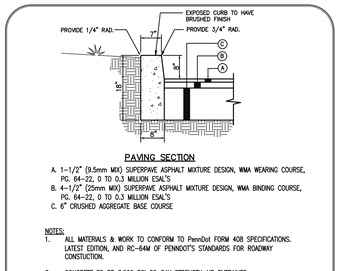
DRIVEWAY NOTE:

1. DRIVEWAY WITHIN THE LEGAL RIGHT-OF-WAY OF THE PUBLIC ROAD SHALL BE CONSTRUCTED WITH CRUSHED AGGREGATE MEETING THE REQUIREMENT OF SECTION 350 OF PENNDOT FORM 408 SPECIFICATIONS, COMPACTED TO A MINIMUM DEPTH OF SIX INCHES. IT SHALL BE SURFACED WITH A MINIMUM OF 2.5 INCHES OF SUPERPAVE OR APPROVED EQUAL.

DRIVEWAY PAVING SECTION DETAIL
NO SCALE



CURB TAPER DETAIL
NO SCALE



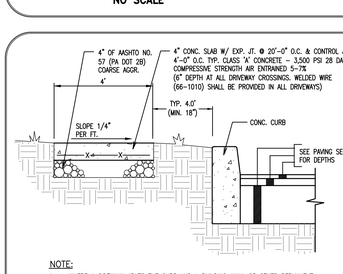
PAVING SECTION

A. 1-1/2" (9.5mm MIX) SUPERPAVE ASPHALT MIXTURE DESIGN, WMA WEARING COURSE, PG. 64-22, 0 TO 0.3 MILLION ESAL'S
B. 4-1/2" (22mm MIX) SUPERPAVE ASPHALT MIXTURE DESIGN, WMA BINDING COURSE, PG. 64-22, 0 TO 0.3 MILLION ESAL'S
C. 6" CRUSHED AGGREGATE BASE COURSE

NOTES:

1. ALL MATERIALS & WORK TO CONFORM TO PennDot FORM 408 SPECIFICATIONS. LATEST EDITION, AND RC-64M OF PENNDOT'S STANDARDS FOR ROADWAY CONSTUCTION.
2. CONCRETE TO BE 3,500 PSI 28-DAY STRENGTH AIR ENTRAINED.
3. CURBS SHALL BE BUILT IN TEN (10) FOOT LENGTHS; CONSTRUCTION JOINTS OF ASPHALT IMPREGNATED PAPER OF ONE-SIXTEENTH (1/16) INCH SHALL BE PROVIDED AT TEN (10) FOOT INTERVALS, AND EXPANSION JOINTS OF ONE-QUARTER (1/4) INCH PREMOLDED FILLER SHALL BE PLACED AT INTERVALS OF ONE HUNDRED (100) FEET.
4. SLOPE TOP SURFACE OF CURB BACK TO FRONT AT 1/4" PER FOOT.

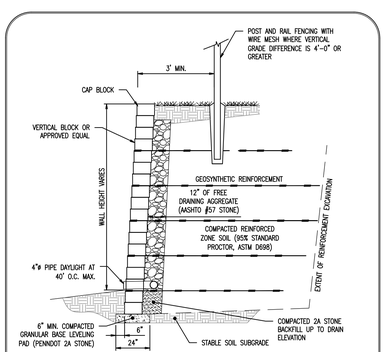
8" CURBING & PAVING SECTION
NOT TO SCALE



NOTE:

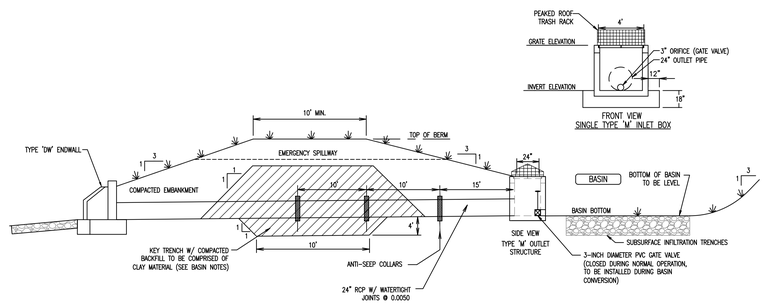
1. WHERE A SIDEWALK ABUTS THE CURB AND A BUILDING, WALL OR OTHER PERMANENT STRUCTURE, A PREMOLDED EXPANSION JOINT 1/4 INCH IN THICKNESS SHALL BE PLACED BETWEEN THE CURB AND THE SIDEWALK FOR THE FULL LENGTH OF SUCH PERMANENT STRUCTURE.

TYPICAL SIDEWALK DETAIL
NO SCALE



1. SPECIFIC DESIGN SPECIFICATIONS WILL BE PROVIDED BY THE MANUFACTURER.
2. SHOP DRAWINGS FOR THE PROPOSED RETAINING WALLS MUST BE APPROVED BY THE TOWNSHIP ENGINEER PRIOR TO CONSTRUCTION.
3. WALL SECTION IS FOR PRELIMINARY BIDDING PURPOSES ONLY. FINAL DESIGN IS THE RESPONSIBILITY OF THE WALL CONTRACTOR AND HIS PROFESSIONAL ENGINEER, WHO WILL PREPARE AND SUBMIT SEALED DESIGNS AND DRAWINGS FOR THE CIVIL ENGINEER OR TOWNSHIP TO REVIEW.
4. WHERE A GUIDERAIL IS REQUIRED, IT SHALL BE INSTALLED AND CONSTRUCTED FROM PRESS-TREATED WOOD, GALVANIZED STEEL OR APPROVED EQUAL.

TYPICAL RETAINING WALL SECTION
NO SCALE



TYPICAL INFILTRATION BASIN EMBANKMENT DETAIL
NO SCALE

STORMWATER INFILTRATION BASIN CONSTRUCTION SPECIFICATIONS:

1. PERIMETER SEDIMENT CONTROL DEVICES MUST BE INSTALLED PRIOR TO CLEARING AND GRUBBING ACTIVITIES. AREAS WHERE THE BASIN AND EMBANKMENT IS TO BE PLACED SHALL BE CLEARED, GRUBBED, AND STRIPPED OF TOPSOIL TO REMOVE TREES, VEGETATION, ROOTS OR OTHER OBJECTIONABLE MATERIAL.
2. HEAVY EQUIPMENT AND TRAFFIC SHALL BE RESTRICTED FROM TRAVELING OVER THE PROPOSED LOCATION OF THE INFILTRATION BASIN TO MINIMIZE COMPACTION OF THE SOIL.
3. THE BOTTOM OF ALL INFILTRATION BMP'S SHALL BE UNDISTURBED OR UNCOMPACTED SUBGRADE SCARIFIED TO A DEPTH OF SIX (6) INCHES.
4. EXCAVATE INFILTRATION BASIN TO WITHIN TWO FEET OF FINAL ELEVATION OF THE BASIN FLOOR. FINAL EXCAVATION TO FINISHED GRADE SHALL BE DEFERRED UNTIL ALL UPGRADIENT-DISTURBED AREAS HAVE BEEN STABILIZED. THE BASIN BOTTOM AND SIDE EMBANKMENTS SHALL BE ROUGHENED WERE SHEARED AND SCALED BY HEAVY EQUIPMENT.
5. ALL BASIN EXCAVATION EQUIPMENT SHALL BE PERFORMED LIGHTWEIGHT, RUBBER-TIRED EQUIPMENT.
6. A CUT-OFF TRENCH SHALL BE EXCAVATED ALONG THE CENTERLINE OF THE EARTH FILL EMBANKMENT. THE MINIMUM DEPTH SHALL BE FOUR FEET. THE CUT-OFF TRENCH SHALL EXTEND UP BOTH ABUTMENTS TO SIX INCHES BELOW THE EMERGENCY SPILLWAY CREST ELEVATION. THE BOTTOM WIDTH SHALL BE FOUR (4) FEET, BUT WIDE ENOUGH TO PERMIT OPERATION OF EXCAVATION AND COMPACTION EQUIPMENT. THE SIDE SLOPES SHALL BE NO STEEPER THAN 3H:1V.
7. FILL MATERIAL FOR THE CUT-OFF TRENCH SHALL BE OF UNIFIED SOIL TYPE CL (OR APPROVED EQUIVALENT).
8. FILL MATERIAL SHALL CONTAIN SUFFICIENT MOISTURE SO THAT IT CAN BE FORMED BY HAND INTO A BALL WITH OUT CRUMBLING. IF WATER CAN BE SQUEEZED OUT OF THE BALL, IT IS TOO WET FOR PROPER COMPACTION.
9. FILL MATERIAL SHALL BE PLACED IN SIX INCH TO EIGHT-INCH CONTINUOUS LIFTS ACROSS THE ENTIRE LENGTH OF THE EMBANKMENT. EACH FILL LIFT SHALL BE COMPACTED TO AN AVERAGE OF 95% OF MAXIMUM MODIFIED DRY DENSITY PER ASTM D-1557.
10. FILL MATERIAL FOR THE EMBANKMENT SHALL BE MINERAL SOIL, FREE OF ROOTS, WOODY VEGETATION, OVERSIZED ROCKS OR OTHER OBJECTIONABLE MATERIAL. RELATIVELY PERVIOUS MATERIAL SUCH AS SAND OR GRAVEL (UNIFIED SOIL CLASSES GW, GP, SW AND SP) OR ORGANIC MATERIALS (UNIFIED SOIL CLASSES OL AND OH) SHALL NOT BE PLACED IN THE EMBANKMENT.
11. THE EMBANKMENT SHALL BE CONSTRUCTED TO AN ELEVATION OF 10 PERCENT HIGHER THAN THE DESIGN HEIGHT TO ALLOW FOR SETTLEMENT IF COMPACTION IS OBTAINED WITH HAULING EQUIPMENT. IF COMPACTION IS OBTAINED THROUGH THE USE OF COMPACTORS, THE OVER BUILD MAY BE REDUCED TO NOT LESS THAN 5 PERCENT.
12. FOLLOWING COMPLETION OF THE FINAL GRADING, THE BOTTOM OF THE BASIN SHALL BE DEEPLY TILLED WITH A ROTARY TILLER OR DISC HARROW AND THEN SMOOTHED OUT WITH A LEVELING DRAG OR EQUIVALENT GRADING EQUIPMENT.
13. THE BASIN SHALL BE STABILIZED IN ACCORDANCE WITH THE APPROPRIATE VEGETATIVE STANDARD AND SPECIFICATIONS IMMEDIATELY FOLLOWING CONSTRUCTION.
14. IF AN INSUFFICIENT AMOUNT OF APPROPRIATE SOILS, AS SPECIFIED IN THESE SPECIFICATIONS, TO CONSTRUCT THE BASIN EMBANKMENT EXIST ON-SITE CONTACT THE GEOTECHNICAL ENGINEER FOR AN APPROPRIATE SOLUTION.
15. ONCE INFILTRATION BMP'S HAVE BEEN CONVERTED TO THEIR FINAL CONFIGURATION, CONTRIBUTING AREAS SHALL BE AT MINIMUM OF 70% STABILIZATION.
16. BASIN EMBANKMENTS TO BE INSPECTED BY THE TOWNSHIP ENGINEER.
17. THE DEVELOPER/OWNER SHALL CONDUCT ADDITIONAL SOIL INFILTRATION TESTS TO THE SAME CRITERIA AND STANDARDS AS PERFORMED DURING THE DESIGN PHASE. FAILURE TO ACHIEVE THE PRE-CONSTRUCTION SOIL INFILTRATION LEVELS WILL BE CAUSE FOR THE DEVELOPER/OWNER TO UNDERTAKE CORRECTIVE ACTIONS AS APPROVED BY THE TOWNSHIP ENGINEER.
18. THE BASINS SHALL BE LINED WITH GEOTEXTILE FABRIC.

CONSTRUCTION SEQUENCE

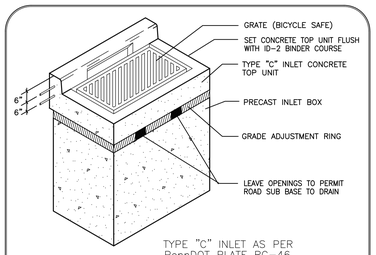
1. PROTECT INFILTRATION BASIN AREA FROM COMPACTION PRIOR TO INSTALLATION.
2. IF POSSIBLE, INSTALL INFILTRATION BASIN DURING LATER PHASES OF SITE CONSTRUCTION TO PREVENT SEDIMENTATION AND/OR DAMAGE FROM CONSTRUCTION ACTIVITY. AFTER INSTALLATION, PREVENT SEDIMENT-LADEN WATER FROM ENTERING INLETS AND PIPES.
3. INSTALL AND MAINTAIN PROPER EROSION AND SEDIMENT CONTROL MEASURES DURING CONSTRUCTION.
4. **CRITICAL STAGE:** EXCAVATE INFILTRATION BASIN BOTTOM TO AN UNCOMPACTED SUBGRADE FREE FROM ROCKS AND DEBRIS. DO NOT COMPACT SUBGRADE.
5. **CRITICAL STAGE:** INSTALL OUTLET CONTROL STRUCTURES.
6. SEED AND STABILIZE TOPSOIL. (VEGETATE IF APPROPRIATE WITH NATIVE PLANTINGS.)
7. DO NOT REMOVE INLET PROTECTION OR OTHER EROSION AND SEDIMENT CONTROL MEASURES UNTIL SITE IS FULLY STABILIZED.

EMBANKMENT CONSTRUCTION/COMPACTION NOTES

1. KEY TRENCH TO EXTEND 4 FEET INTO UNDISTURBED SUBSOIL.
2. IMPERVIOUS CORE AND KEY TRENCH W/ COMPACTED BACKFILL UNIFIED SOILS TYPE CL-ML OR CL CLASSIFICATION OR APPROVED EQUAL.
3. THE CONTRACTOR SHALL PROVIDE SOIL TESTING OR SOIL VERIFICATION FOR CORE TRENCH BACKFILL TO THE TOWNSHIP ENGINEER PRIOR TO CONSTRUCTING EMBANKMENT.
4. CORE TRENCH TOP ELEVATION SHALL BE SET AT 6 INCHES BELOW THE EMERGENCY SPILLWAY.
5. THE CUT-OFF TRENCH SHALL BE EXCAVATED ALONG THE CENTERLINE OF THE EARTH FILL EMBANKMENT. THE MINIMUM DEPTH SHALL BE FOUR FEET. THE CUT-OFF TRENCH SHALL EXTEND UP BOTH ABUTMENTS TO AN ELEVATION 6 INCHES BELOW THE EMERGENCY SPILLWAY. THE BOTTOM WIDTH SHALL BE FOUR (4) FEET, BUT WIDE ENOUGH TO PERMIT OPERATION OF EXCAVATION AND COMPACTION EQUIPMENT. THE SIDE SLOPES SHALL BE NO STEEPER THAN 4H:1V.

MAINTENANCE

1. CATCH BASINS AND INLETS (UPGRADIENT OF INFILTRATION BASIN) SHOULD BE INSPECTED AND CLEANED AT LEAST ONCE PER YEAR AND AFTER MAJOR RUNOFF EVENTS.
2. THE VEGETATION ALONG THE SURFACE OF THE INFILTRATION BASIN SHOULD BE MAINTAINED IN GOOD CONDITION, AND ANY BARE SPOTS REVEGETATED AS SOON AS POSSIBLE.
3. VEHICLES SHOULD NOT BE PARKED OR DRIVEN ON AN INFILTRATION BASIN, AND CARE SHOULD BE TAKEN TO AVOID EXCESSIVE COMPACTION BY MOWERS.
4. INSPECT THE BASIN AFTER RUNOFF EVENTS AND MAKE SURE THAT RUNOFF DRAINS DOWN WITHIN 72 HOURS. MOSQUITOS SHOULD NOT BE A PROBLEM IF THE WATER DRAINS IN 72 HOURS. MOSQUITOES REQUIRE A CONSIDERABLY LONG BREEDING PERIOD WITH RELATIVELY STATIC WATER LEVELS.
5. ALSO INSPECT FOR ACCUMULATION OF SEDIMENT, DAMAGE TO OUTLET CONTROL STRUCTURES, EROSION CONTROL MEASURES, SIGNS OF WATER CONTAMINATION/SPILLS, AND SLOPE STABILITY IN THE BERMS.
6. MOW ONLY AS APPROPRIATE FOR VEGETATIVE COVER SPECIES.
7. REMOVE ACCUMULATED SEDIMENT FROM BASIN AS REQUIRED. RESTORE ORIGINAL CROSS SECTION AND INFILTRATION RATE. PROPERLY DISPOSE OF SEDIMENT.



TYPE "M" INLET AS PER PennDOT PLATE RC-46.

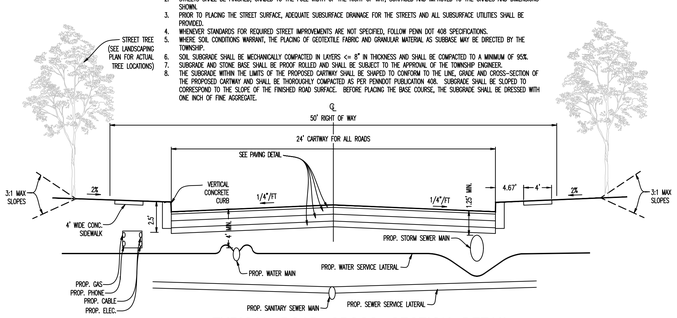
TYPE 'M' INLET
NO SCALE

TYPE "C" INLET AS PER PennDOT PLATE RC-46.

TYPE 'C' INLET
NO SCALE

PAVEMENT NOTES: (APPLIES TO ALL STREET CROSS-SECTIONS)

1. THE PAVEMENT EDGE AROUND ALL CURB MUST BE SCALED AND IF THE BITUMINOUS WEARING COURSE IS NOT APPLIED IMMEDIATELY AFTER THE BINDER COURSE, A TACK COAT MUST BE PLACED IN ACCORDANCE WITH PENN DOT 408 SPECIFICATIONS.
2. STREETS SHALL BE FINISHED, GRADED TO THE FULL WIDTH OF THE RIGHT OF WAY, SURFACED AND IMPROVED TO THE GRADES AND DIMENSIONS SHOWN.
3. PRIOR TO PLACING THE STREET SURFACE, ADEQUATE SUBSURFACE DRAINAGE FOR THE STREETS AND ALL SUBSURFACE UTILITIES SHALL BE PROVIDED.
4. WHENEVER STANDARDS FOR REQUIRED STREET IMPROVEMENTS ARE NOT SPECIFIED, FOLLOW PENN DOT 408 SPECIFICATIONS.
5. WHERE SOIL CONDITIONS WARRANT, THE PLACING OF GEOTEXTILE FABRIC AND GRANULAR MATERIAL AS SUBBASE MAY BE DIRECTED BY THE TOWNSHIP.
6. SOIL SUBGRADE SHALL BE MECHANICALLY COMPACTED IN LAYERS <= 8" IN THICKNESS AND SHALL BE COMPACTED TO A MINIMUM OF 95%.
7. SUBGRADE AND STONE BASE SHALL BE PROOF ROLLED AND SHALL BE SUBJECT TO THE APPROVAL OF THE TOWNSHIP ENGINEER.
8. THE SUBGRADE WITHIN THE LIMITS OF THE PROPOSED CARTWAY SHALL BE SHAPED TO CONFORM TO THE LINE, GRADE AND CROSS-SECTION OF THE PROPOSED CARTWAY AND SHALL BE THOROUGHLY COMPACTED AS PER PENNDOT PUBLICATION 408. SUBGRADE SHALL BE SLOPED TO CORRESPOND TO THE SLOPE OF THE FINISHED ROAD SURFACE. BEFORE PLACING THE BASE COURSE, THE SUBGRADE SHALL BE DRESSED WITH ONE INCH OF FINE AGGREGATE.



TYPICAL ROAD CROSS-SECTION DETAIL
NO SCALE

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Fax: (610) 918-9003

BOX	DATE	DESCRIPTION
1	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEW
2		
3		
4		
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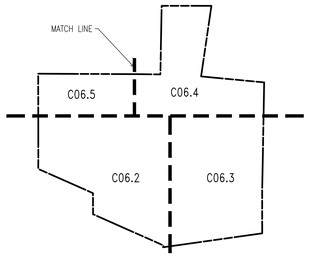
CONDITIONAL USE

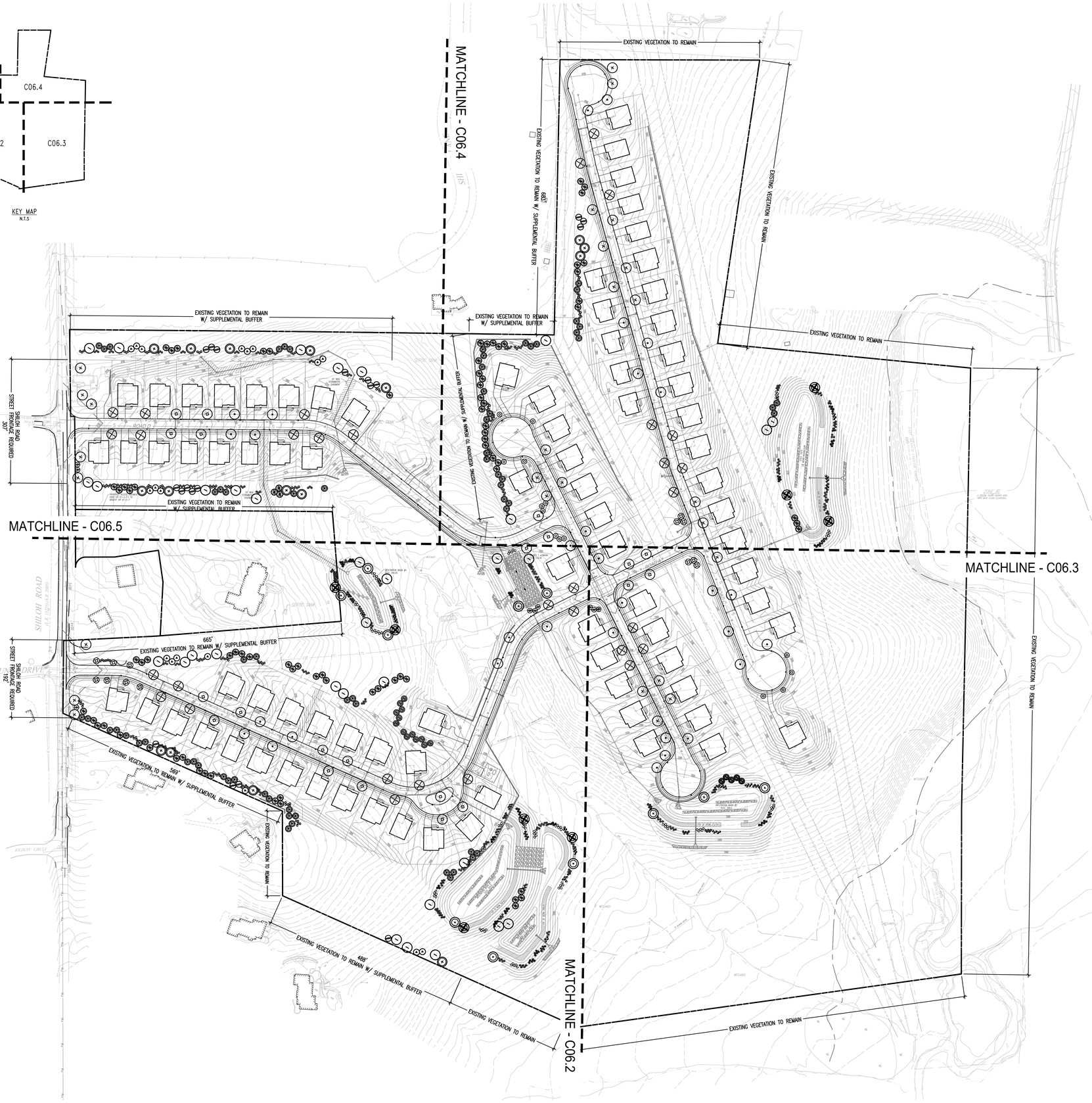
CONSTRUCTION DETAILS

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD, WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	AS SHOWN
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	C1 CONSTRUCTION DETAILS.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C05.1
SHEET	22 OF 38



KEY MAP
N.T.S



OVERALL LANDSCAPE PLAN
SCALE: 1"=100'

100 0 50 100 200

GRAPHIC SCALE
1 inch = 100 feet

SITE PLAN NOTES:

1. ALL LINES AND GRADE WORK NOT PRESENTLY ESTABLISHED AT THE SITE SHALL BE LAID OUT BY A REGISTERED LAND SURVEYOR OR PROFESSIONAL CIVIL ENGINEER EMPLOYED BY THE CONTRACTOR IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
2. THIS PLAN TO BE USED FOR LANDSCAPING AND SITE IMPROVEMENT PURPOSED ONLY.
3. PLANS CREATED FROM DRAWINGS FROM DL HOWELL ENGINEERING DATED, 04/12/2023.
4. LOCATION OF ALL UNDERGROUND UTILITIES SHALL BE VERIFIED AND MARKED IN THE FIELD, PRIOR TO ANY DIGGING OPERATIONS.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING EXISTING TREES AND PLANT MATERIAL WITHIN THE AREA OF PROPOSED IMPROVEMENTS.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSING OF ALL DEBRIS OFF-SITE. CLEAN-UP OF ALL PAVED AREAS (ROADWAYS, SIDEWALKS, ETC.); AND RESTORATION OF ALL DISTURBED LAWN AREAS.
7. CONTRACTOR SHALL BE RESPONSIBLE TO REPAIR ANY DAMAGE TO UNDERGROUND UTILITIES DAMAGED.
8. CONTRACTOR SHALL PROVIDE SCREENED PLANTING SOIL WHERE PLANTING IS TO OCCUR. 36" DEPTH. 6" DEPTH AT LAWN AREAS.
9. FOLLOWING COMPLETION OF ALL PLANTING INSTALLATION WORK, THE CONTRACTOR SHALL BE REQUIRED TO RESTORE ALL DISTURBED LAWN AREAS.
10. NO TREE SHALL BE PLANTED CLOSER THAN 10 FEET FROM AN UNDERGROUND UTILITY.
11. ALL LINES ARE PARALLEL OR PERPENDICULAR UNLESS SHOWN OTHERWISE.
12. VERIFY LAYOUT OF ALL PROPOSED WORK TO EXISTING CONDITIONS. REPORT DISCREPANCIES BEFORE ANY CLEARING OR EXCAVATION IS DONE.
13. PROVIDE STAKED LAYOUT ON SITE FOR OWNER AND LANDSCAPE ARCHITECT'S REVIEW PRIOR TO COMMENCING WORK.
14. ALL DIMENSIONS SHOWN ARE TO FACE OF MATERIALS, UNLESS SHOWN OTHERWISE.
15. PLEASE NOTE, CLIENT DID NOT RETAIN STUART AND ASSOCIATES, LLC.. TO PROVIDE LONG TERM MAINTENANCE SPECIFICATIONS FOR THE LANDSCAPE MATERIAL.
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19. V.I.F. = VERIFY IN FIELD.

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PLANNERS | DESIGNERS

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NO.	DATE	DESCRIPTION
1	6-14-23	PER TOWNSHIP ENGINEER COMMENTS
2		
3		
4		
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6		
7		

CONDITIONAL USE
OVERALL LANDSCAPE PLAN
CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD
WESTTOWN TWP., CHESTER COUNTY, PA

DATE:	04/17/23
SCALE:	1"=100'
DRAWN BY:	JPL
CHECKED BY:	PJS
PROJECT NO.:	3868
CAD FILE:	20230616_STOKES_TLP.dwg
PLOTTED:	06/14/23
DRAWING NO.:	C06.1
SHEET:	23 OF 37

MATCHLINE - C06.5

MATCHLINE - C06.4

MATCHLINE - C06.3

SHILOH ROAD

HUNT DRIVE

KILDUFF CIRCLE

ROAD A

INFILTRATION BASIN #4

MATCH LINE

C06.5 C06.4 C06.2 C06.3

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LANDSCAPE PLAN
SCALE: 1"=50'

50 0 25 50 100

GRAPHIC SCALE
1 inch = 50 feet

stuart
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NO.	DATE	DESCRIPTION
1	6-14-23	PER TOWNSHIP ENGINEER COMMENTS
2		
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CONDITIONAL USE
LANDSCAPE PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD
WESTTOWN TWP., CHESTER COUNTY, PA

DATE:	04/17/23
SCALE:	1"=50'
DRAWN BY:	JPL
CHECKED BY:	PJS
PROJECT NO.:	3868
CAD FILE:	20230616_STOKES_TLP.dwg
PLOTTED:	06/14/23
DRAWING NO.:	C06.2
SHEET	24 OF 37

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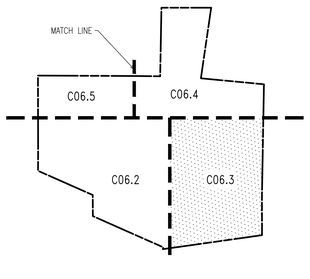

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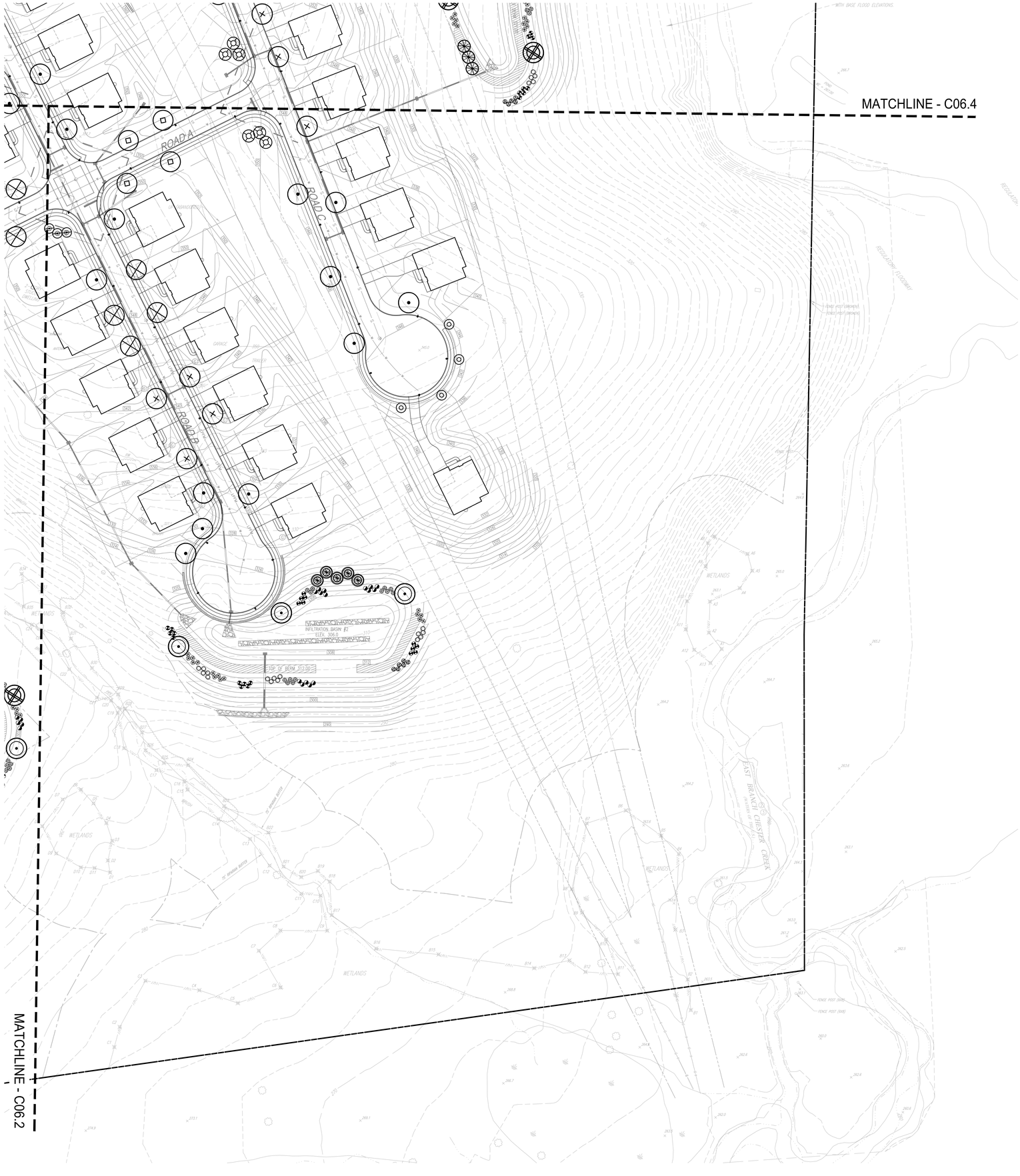

LANDSCAPE PLAN
SCALE: 1"=50'

50 0 25 50 100
GRAPHIC SCALE
1 inch = 50 feet

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COMMONWEALTH OF PENNSYLVANIA
PATRICK J. STUART
No. LA001405
REGISTERED LANDSCAPE ARCHITECT

NO.	DATE	DESCRIPTION
1	6-14-23	PER TOWNSHIP ENGINEER COMMENTS
2		
3		
4		
5		
6		
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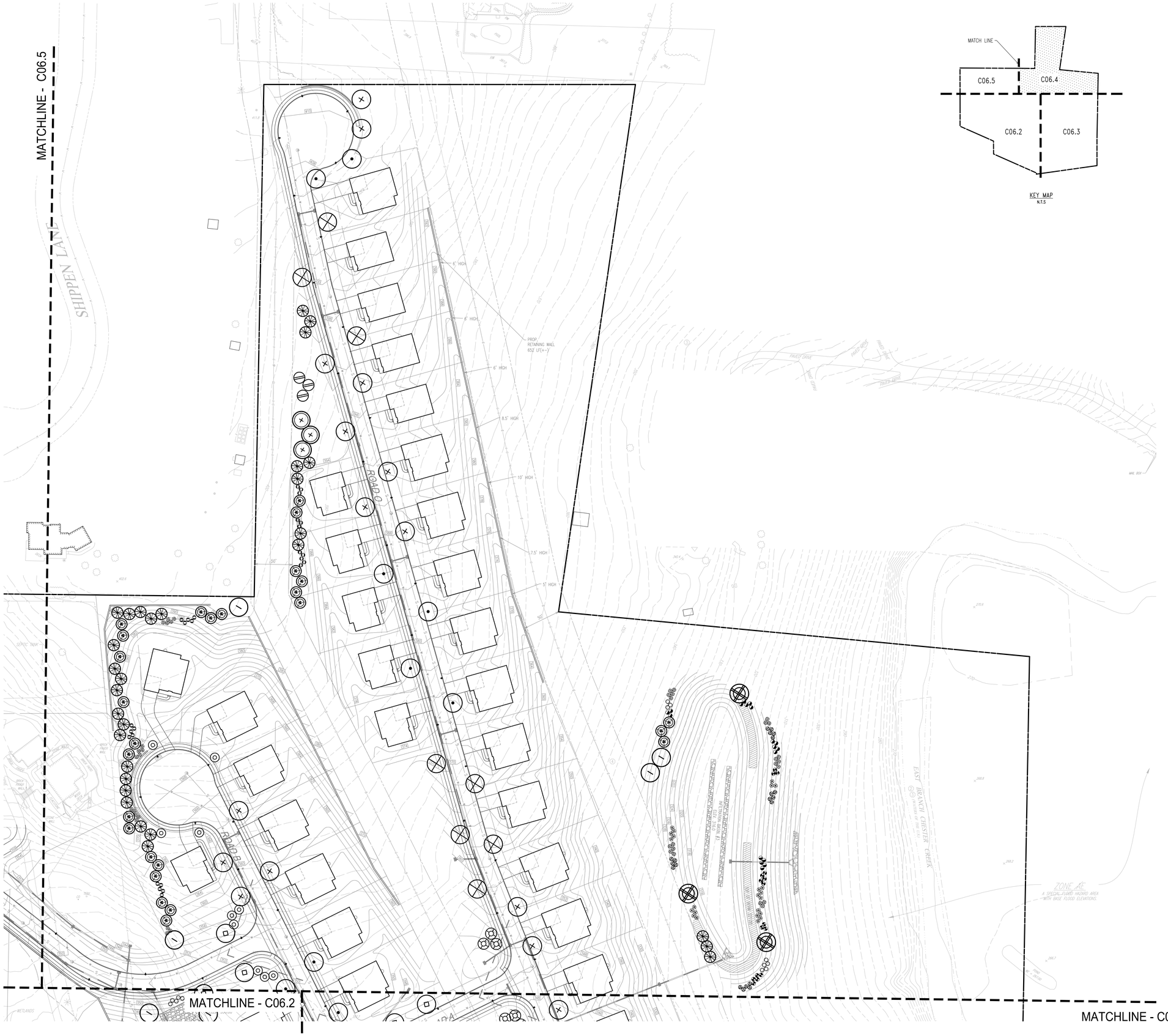
CONDITIONAL USE
LANDSCAPE PLAN
CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD
WESTTOWN TWP., CHESTER COUNTY, PA

DATE:	04/17/23
SCALE:	1"=50'
DRAWN BY:	JPL
CHECKED BY:	PJS
PROJECT NO.:	3868
CAD FILE:	20230616_STOKES_TLP.dwg
PLOTTED:	06/14/23
DRAWING NO.:	C06.3
SHEET	25 of 37

D:\DIGSITE PROJECT FILES\D.L. HOWELL\STOKES PROPERTY - WESTTOWN TOWNSHIP\TOWNSHIP LANDSCAPE PLAN\20230617_STOKES TLP\20230616_STOKES_TLP.DWG



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15. PLEASE NOTE, CLIENT DID NOT RETAIN STUART AND ASSOCIATES, LLC. TO PROVIDE LONG TERM MAINTENANCE SPECIFICATIONS FOR THE LANDSCAPE MATERIAL.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING PA ONE CALL AND LOCATING ALL UNDERGROUND UTILITIES BEFORE ANY DIGGING OR PLANT REMOVAL OCCURS.
17. CONTRACTOR SHALL INSTALL SILT FENCE IN ANY AREAS WHERE SOIL MAY RUNOFF INTO PARKING AREAS OR INTO EXISTING INLETS.
18. FOLLOWING THE COMPLETION, THE EXISTING VEGETATION WILL BE INSPECTED FOR HEALTH AND QUALITY, AND IF NOT DEEMED IN GOOD CONDITION, REPLACED WITH THE EQUIVALENT COMPENSATORY PLANTINGS.
19. V.I.F. = VERIFY IN FIELD.

LANDSCAPE PLAN
SCALE: 1"=50'

50 0 25 50 100
GRAPHIC SCALE
1 inch = 50 feet

stuart
LANDSCAPE ARCHITECTS
PLANNERS | DESIGNERS

DLHowell
Civil Engineering
Land Planning
Environmental
www.DLHowell.com

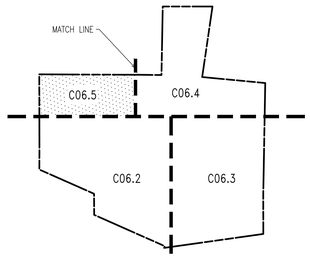
1250 Wrights Lane
West Chester, PA 19380
Phone: (610) 918-9002
Fax: (610) 918-9003

COMMONWEALTH OF PENNSYLVANIA
PATRICK J. STUART
REGISTERED LANDSCAPE ARCHITECT

NO	DESCRIPTION	DATE
1	PER TOWNSHIP ENGINEER COMMENTS	6-14-23
2		
3		
4		
5		
6		
7		
8		

CONDITIONAL USE
LANDSCAPE PLAN
CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD
WESTTOWN TWP., CHESTER COUNTY, PA

DATE:	04/17/23
SCALE:	1"=50'
DRAWN BY:	JJPL
CHECKED BY:	PJS
PROJECT NO.:	3868
CAD FILE:	20230616_STOKES_TLP.dwg
PLOTTED:	06/14/23
DRAWING NO.:	C06.4
SHEET	26 OF 37



KEY MAP
N.T.S

MATCHLINE - C06.4

MATCHLINE - C06.2

SITE PLAN NOTES:

1. ALL LINES AND GRADE WORK NOT PRESENTLY ESTABLISHED AT THE SITE SHALL BE LAID OUT BY A REGISTERED LAND SURVEYOR OR PROFESSIONAL CIVIL ENGINEER EMPLOYED BY THE CONTRACTOR IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
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LANDSCAPE PLAN
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GRAPHIC SCALE
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PLOTTED:	06/14/23
DRAWING NO.:	C06.5
SHEET	27 OF 37

WESTTOWN TOWNSHIP LANDSCAPE REQUIREMENTS

DISTRICT: R-1 RESIDENTIAL DISTRICT

SALDO:	REQUIRED	PROPOSED
§149-922. BUFFERS: As required by Zoning §170-1508		
B. All buffers shall include a completely planted visual barrier or landscape screen. (1) Existing tree masses shall be retained wherever possible. (3) The landscape screen shall be composed of both high-level and low-level plantings. (a) The high-level screen shall consist of a combination of evergreen trees and deciduous trees.	NOT SPECIFIED	75 TREES 132 TREES 227 SHRUBS
(b) The low-level screen shall consist of evergreen shrubs.		
§149-924. EXISTING TREES:		
D.12. COMPENSATORY PLANTING. B. NON-SPECIMEN TREES: (1) ONE INCH OF NEW TREE CALIPER SHALL BE PROVIDED FOR EVERY (4) FOUR INCHES OF TREE DIAMETER REMOVED.		
# INCHES REMOVED / 4 INCHES = # REPLACEMENT INCHES # REPLACEMENT INCHES / 3 1/2 INCHES = # TREES REQUIRED	TO BE DETERMINED DURING LAND DEVELOPMENT PHASE	
SPECIMEN TREES: (1) ONE INCH OF NEW TREE DIAMETER FOR EVERY (1) ONE INCH OF TREE DIAMETER TO BE REMOVED.		
# INCHES REMOVED / 4 INCHES = # REPLACEMENT INCHES # REPLACEMENT INCHES / 3 1/2 INCHES = # TREES REQUIRED	TO BE DETERMINED DURING LAND DEVELOPMENT PHASE	
COMPENSATORY TREES SHALL BE 3 1/2 INCHES IN CALIPER. EVERGREEN TREES MAY BE SUBSTITUTED AS A RATIO OF (2) TWO EVERGREENS TO (1) ONE DECIDUOUS TREE.		
§149-925. LANDSCAPING REQUIREMENTS AND STANDARDS:		
G. MINIMUM PLANT QUANTITIES. 1. LOT OR PERIMETER YARD: PER 100 LINEAR FEET, STREET FRONTAGES SHALL HAVE 1.5 CANOPY TREES AND 0.5 ORNAMENTAL FLOWERING TREES.		
SHILOH RD = 499 LF 499' / 100 = 5.0 3.1 X 1.5 = 7.5 3.1 X 0.5 = 2.5	8 CANOPY TREES 3 ORNAMENTAL TREES	8 TREES 3 TREES
ROAD A = 1440 LF 1440' / 100 = 12.5 14.4 X 1.5 = 21.6 14.4 X 0.5 = 7.2	22 CANOPY TREES 7 ORNAMENTAL TREES	22 TREES 7 TREES
ROAD B = 675 LF 675' / 100 = 6.75 6.75 X 1.5 = 10.2 6.75 X 0.5 = 3.4	10 CANOPY TREES 3 ORNAMENTAL TREES	10 TREES 3 TREES
ROAD C = 1990 LF 1990' / 100 = 19.9 19.9 X 1.5 = 29.8 19.9 X 0.5 = 9.9	30 CANOPY TREES 10 ORNAMENTAL TREES	30 TREES 10 TREES
ROAD D = 1410 LF 1410' / 100 = 14.1 14.1 X 1.5 = 21.15 14.1 X 0.5 = 7	21 CANOPY TREES 7 ORNAMENTAL TREES	21 TREES 7 TREES
ROAD E = 1280 LF 1280' / 100 = 12.8 12.8 X 1.5 = 19.2 12.8 X 0.5 = 6.4	19 CANOPY TREES 6 ORNAMENTAL TREES	19 TREES 6 TREES
2. STORMWATER RETENTION/DETENTION BASINS: A. DECIDUOUS OR EVERGREEN TREES AT THE RATE OF ONE TREE PER 2,000 SQ FT OF BASIN AREA B. SHRUBS, HEDGES, OR YEWS AT THE RATE OF ONE PLANT PER 200 SQ FT OF BASIN AREA. 101,508 TOTAL SQ FT OF BASIN AREA 101,508 / 2,000 = 50.8 101,508 / 200 = 507.5	51 TREES 508 SHRUBS	51 TREES 508 SHRUBS

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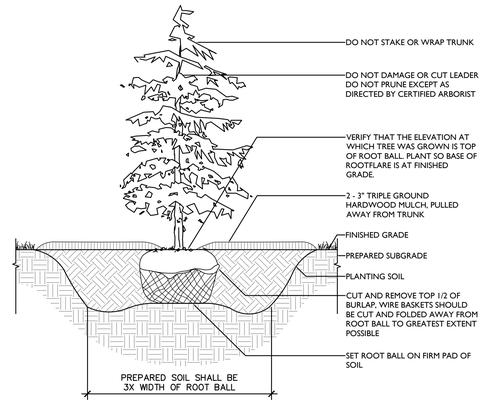
GENERAL PLANTING NOTES:

1. ALL PLANT MATERIAL SHALL BE GUARANTEED FOR 18 MONTHS.
2. ALL PLANT MATERIAL SHALL BE OF SPECIMEN QUALITY.
3. ALL PLANT MATERIAL SHALL BE LAID OUT IN FIELD BY LANDSCAPE ARCHITECT. (NOTE: NO SHRUBS SHALL BE PLANTED UNTIL ALL TREE PLANTING IS COMPLETED.)
4. ALL PLANT MATERIAL SHALL BE THOROUGHLY WATERED DURING INSTALLATION AND THROUGHOUT THE GUARANTEE PERIOD.
5. ALL PLANT MATERIAL SHALL BE WATERED BY CONTRACTOR AT LEAST THREE (3) TIMES IN ABSENCE OF NATURAL RAINFALL OR UNTIL THE END OF THE GUARANTEE PERIOD.
6. ALL TREES SHALL BE PROVIDED WITH A 3" DEEP SAUCER, CONSISTING OF SHREDDED OAK BARK MULCH.
7. ALL PLANT MATERIALS SHALL BE IN ACCORDANCE WITH THE AMERICAN STANDARDS FOR NURSERY STOCK (ANSI Z60.1-2004). PLANT ACCORDING TO ANSI A300 PART 6.
8. CONTRACTOR SHALL PROVIDE LANDSCAPE ARCHITECT WITH NURSERY SOURCE OF ALL PLANT MATERIAL. LANDSCAPE ARCHITECT SHALL PERFORM A SITE VISIT TO INSPECT NURSERY SOURCE PRIOR TO DELIVERY OF ANY PLANT MATERIAL.
9. ALL TREES AND SHRUBS DELIVERED TO THE SITE SHALL BE INSPECTED AND APPROVED BY THE LANDSCAPE ARCHITECT PRIOR TO PLANTING. ALL TREES AND SHRUBS SHALL HAVE WATERPROOF TAG BEARING LEGIBLE DESIGNATION OF BOTANICAL AND COMMON NAME.
10. ALL PLANT SUBSTITUTIONS MUST BE APPROVED BY THE TOWNSHIP .
11. ANY PLANT MATERIAL EXHIBITING SIGNS OF DISEASE, INSECTS, EGGS, LARVAE AND DEFECTS SUCH AS KNOTS, SUN-SCALD, INJURIES, ABRASIONS OR DISFIGUREMENT SHALL BE REJECTED.
12. ALL PROPOSED SHRUBS SHALL BE PLANTED IN CONTINUOUS MULCHED BEDS, CONSISTING OF 3" OF OAK BARK MULCH.
13. SCARIFY THE SUBGRADE AND SIDES OF THE PLANTING HOLE WHEN PLANTING IN CLAY SOILS (MORE THAN 15% CLAY).
14. LIFT AND SET THE TREE BY ROOTBALL ONLY. DO NOT LIFT USING THE TREE TRUNK AND DO NOT USE TREE TRUNK AS A LEVER.
15. SET THE TOP OF THE ROOTBALL LEVEL WITH THE SOIL SURFACE OR SLIGHTLY HIGHER IF THE SOIL IS PRONE TO SETTLING.
16. AFTER THE TREE IS SET IN PLACE, REMOVE BURLAP, WIRE AND STRAPS FROM AT LEAST THE UPPER 1/2 OF THE ROOTBALL.
17. PRUNING SHALL BE LIMITED TO DEAD, DISEASED, OR BROKEN LIMBS ONLY AND SHALL BE IN ACCORDANCE WITH THE ANSI A300 SPECIFICATIONS. IF ADDITIONAL PRUNING IS NECESSARY, IT SHALL BE DONE BY A CERTIFIED ARBORIST.
18. REMOVE ANY TRUNK WRAP REMAINING AT TIME OF PLANTING. NO WRAPS SHALL BE PLACED ON TRUNK.
19. DO NOT REMOVE TREE IDENTIFICATION TAGS UNTIL THE LANDSCAPE ARCHITECT HAS CONFIRMED CORRECT SPECIES MATCHES THE PROJECT PLANTING SCHEDULE.
20. LANDSCAPING MATERIALS SHALL BE FIELD ADJUSTED DURING INSTALLATION TO AVOID CONFLICT BETWEEN THE LIGHT FIXTURES, UTILITIES, AND TREE CANOPIES.

Plant Schedule

Quantity	Symbol	Scientific Name	Common Name	Size
Buffers				
16		*Acer saccharum*	Sugar Maple	2.5-3" cal. min., B&B
22		*Acer rubrum*	Red Maple	2.5-3" cal. min., B&B
18		*Diospyros Virginiana*	Persimmon	2.5-3" cal. min., B&B
19		*Sassafras albidium*	Sassafras	2.5-3" cal. min., B&B
73		*Picea abies*	Norway Spruce	8-10' ht., B&B
59		*Picea glauca*	White Spruce	8-10' ht., B&B
105		*Myrica pennsylvanica*	Bayberry	36-42" ht., 30-36" spacing
122		*Viburnum x praganese*	Prague Viburnum	36-42" ht., 30-36" spacing
Street Frontage				
31		*Gleditsia tricanthos inermis* 'Skyline'	'Skyline' Thornless Honeylocust	3-3.5" cal. min., B&B
21		*Quercus imbricaria*	Shingle Oak	3-3.5" cal. min., B&B
31		*Celtis occidentalis*	Hackberry	3-3.5" cal. min., B&B
27		*Platanus x acerfolia* 'Exclamation'	'Exclamation' London Planetree	3-3.5" cal. min., B&B
13		*Amelachier canadensis*	Serviceberry	8-10' ht., B&B
9		*Cornus florida rubra* 'Cherokee Brave'	'Cherokee Brave' Dogwood	8-10' ht., B&B
14		*Cercis canadensis*	Eastern Redbud	8-10' ht., B&B
Basins				
8		*Liquidambar styraciflua*	American Sweetgum	3-3.5" cal. min., B&B
11		*Betula nigra*	River Birch	3-3.5" cal. min., B&B
11		*Acer rubrum*	Red Maple	3-3.5" cal. min., B&B
7		*Picea abies*	Norway Spruce	7-8' ht. min., B&B
9		*Picea glauca*	White Spruce	7-8' ht. min., B&B
5		*Thuja plicata* 'Green Giant'	'Green Giant' Arborvitae	7-8' ht. min., B&B
85		*Ilex glabra*	Inkberry Holly	24-30" ht., 30-36" spacing
85		*Hamamelis virginiana* 'Little Suzie'	'Little Suzie' Dwarf Witch Hazel	24-30" ht., 30-36" spacing
85		*Cornus sericea*	Red Osier Dogwood	24-30" ht., 30-36" spacing
83		*Lindera benzoin*	Spicebush	24-30" ht., 30-36" spacing
85		*Sambucus canadensis*	Elderberry	24-30" ht., 30-36" spacing
85		*Clethra alnifolia* 'Hummingbird'	'Hummingbird' Summersweet	24-30" ht., 30-36" spacing
Additional Landscaping				
13		*Thuja plicata* 'Green Giant'	'Green Giant' Arborvitae	7-8' ht. min., B&B

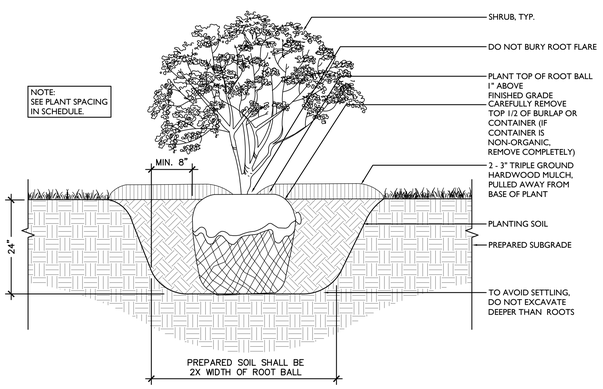


NOTES:

1. TO AVOID SETTLING, DO NOT DIG THE HOLE DEEPER THAN THE ROOT BALL DEPTH.
2. SCARIFY THE SUBGRADE AND SIDES OF THE PLANTING HOLE WHEN PLANTING IN CLAY SOILS.

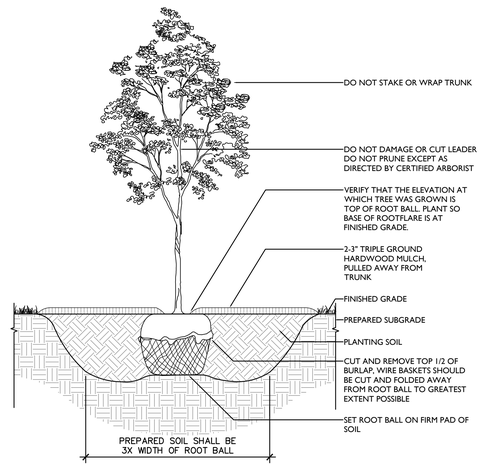
2 EVERGREEN TREE PLANTING DETAIL ON GRADE

SCALE : 1/2" = 1'-0"



3 SHRUB DETAIL ON GRADE

SCALE : 1" = 1'-0"



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1 DECIDUOUS TREE PLANTING DETAIL ON GRADE

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CONDITIONAL USE

DETAILS AND NOTES

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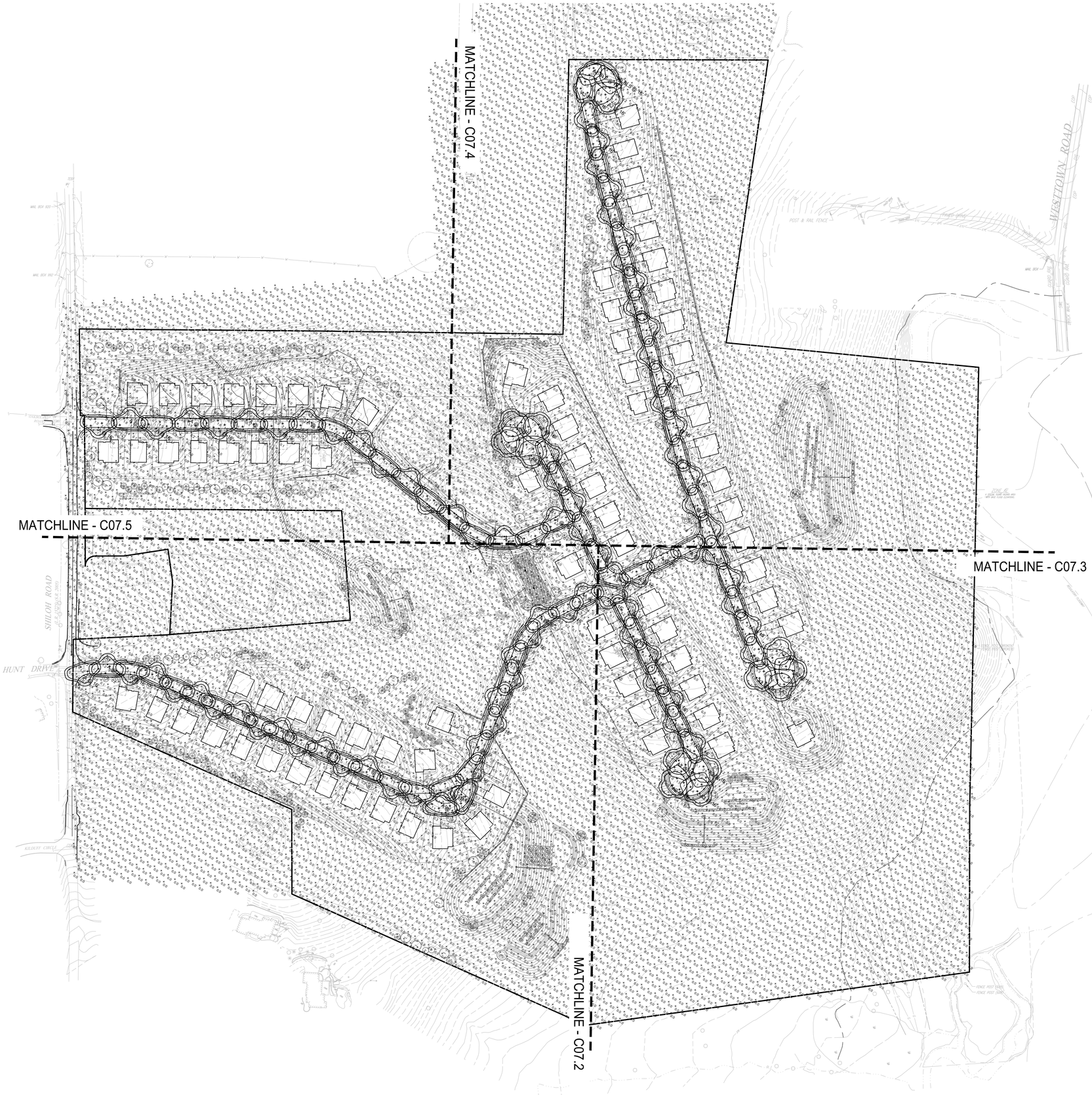

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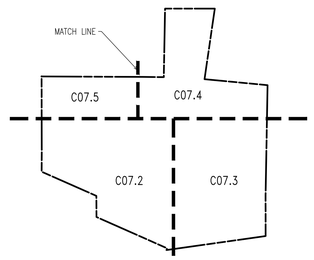
SPEC NOTES:

1. POST LIGHT TO BE INSTALLED ON MATCHING FINISH POLE.
2. FINISH/COLOR : BLACK
3. MOUNTING HEIGHT : 16'
4. SEE PLAN/SCHEDULE FOR DISTRIBUTION TYPE
5. WATTAGE TO BE SELECTED BY CONTRACTOR.

CONTRACTOR NOTES:

1. GENERAL CONTRACTOR TO COORDINATE AND PROVIDE CONDUIT PER LIGHTING SHOWN.
2. CONTRACTOR TO PROVIDE LIGHTING SUBMITTAL FOR FINAL APPROVAL BY OWNER AND LANDSCAPE ARCHITECT.
3. REFER TO MANUFACTURER FOR INSTALLATION INSTRUCTIONS.



KEY MAP
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OVERALL LANDSCAPE PLAN
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100 0 50 100 200

GRAPHIC SCALE
1 inch = 100 feet

stuart
LANDSCAPE ARCHITECTS
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illuminations

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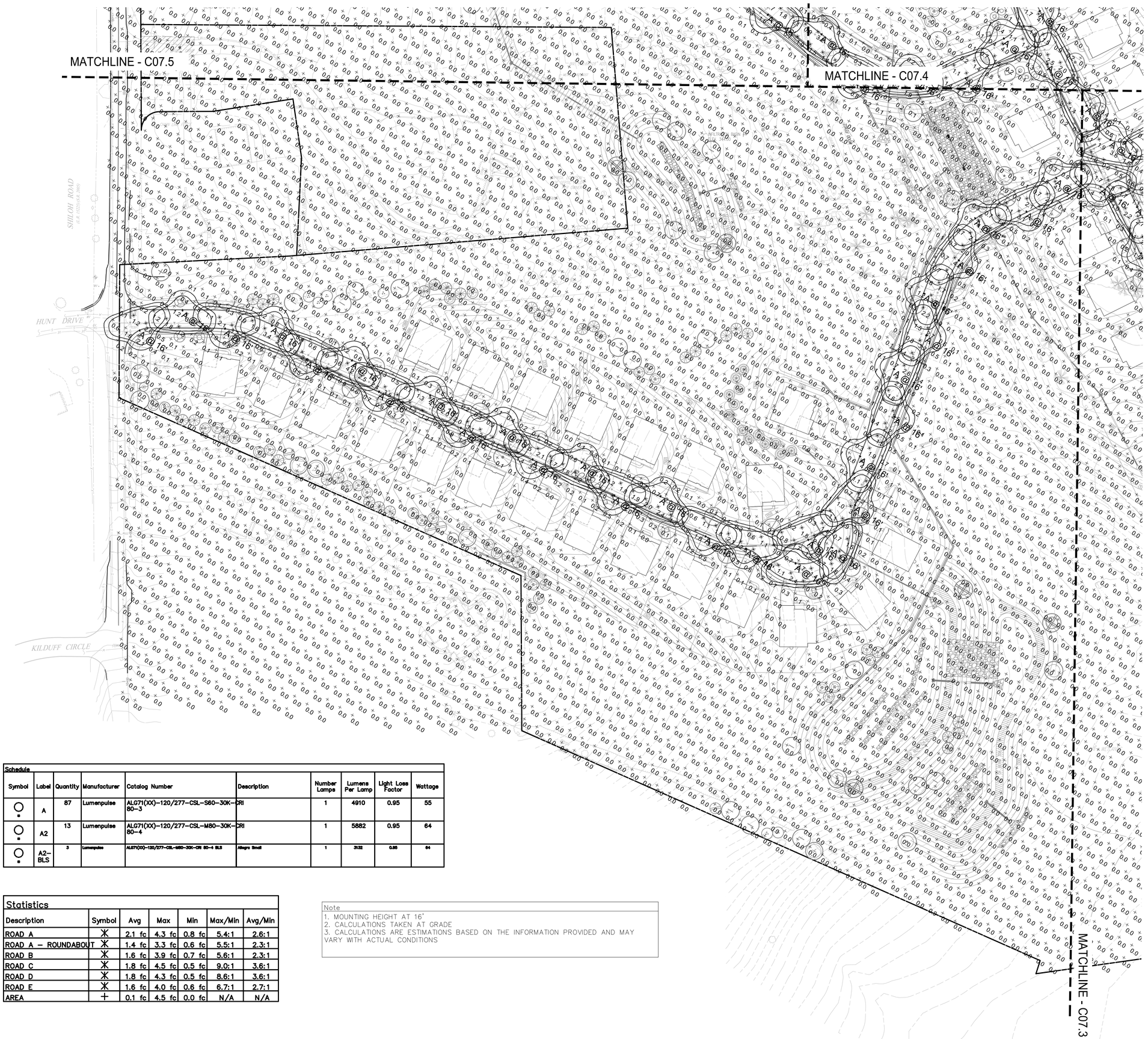
8		

CONDITIONAL USE

OVERALL LIGHTING PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD
WESTTOWN TWP., CHESTER COUNTY, PA

DATE:	04/17/23
SCALE:	1"=100'
DRAWN BY:	JPL
CHECKED BY:	PJS
PROJECT NO.:	3868
CAD FILE:	20230616_STOKES_TLP.dwg
PLOTTED:	06/14/23
DRAWING NO.:	C07.1
SHEET	29 OF 37



Schedule

Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Number Lamps	Lumens Per Lamp	Light Loss Factor	Wattage
○ ▪	A	87	Lumenpulse	ALG71(XX)-120/277-CSL-S60-30K-CRI 80-3		1	4910	0.95	55
○ ▪	A2	13	Lumenpulse	ALG71(XX)-120/277-CSL-M80-30K-CRI 80-4		1	5882	0.95	64
○ ▪	A2-BLS	3	Lumenpulse	ALG71(XX)-120/277-CSL-M80-30K-CRI 80-4 BLS	Allegro Small	1	3132	0.95	64

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
ROAD A	✳	2.1 fc	4.3 fc	0.8 fc	5.4:1	2.6:1
ROAD A – ROUNDABOUT	✳	1.4 fc	3.3 fc	0.6 fc	5.5:1	2.3:1
ROAD B	✳	1.6 fc	3.9 fc	0.7 fc	5.6:1	2.3:1
ROAD C	✳	1.8 fc	4.5 fc	0.5 fc	9.0:1	3.6:1
ROAD D	✳	1.8 fc	4.3 fc	0.5 fc	8.6:1	3.6:1
ROAD E	✳	1.6 fc	4.0 fc	0.6 fc	6.7:1	2.7:1
AREA	+	0.1 fc	4.5 fc	0.0 fc	N/A	N/A

Note
1. MOUNTING HEIGHT AT 16'
2. CALCULATIONS TAKEN AT GRADE
3. CALCULATIONS ARE ESTIMATIONS BASED ON THE INFORMATION PROVIDED AND MAY VARY WITH ACTUAL CONDITIONS

SITE PLAN NOTES:

1. ALL LINES AND GRADE WORK NOT PRESENTLY ESTABLISHED AT THE SITE SHALL BE LAID OUT BY A REGISTERED LAND SURVEYOR OR PROFESSIONAL CIVIL ENGINEER EMPLOYED BY THE CONTRACTOR IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
2. THIS PLAN TO BE USED FOR LANDSCAPING AND SITE IMPROVEMENT PURPOSED ONLY.
3. PLANS CREATED FROM DRAWINGS FROM DL HOWELL ENGINEERING DATED, 04/12/2023.
4. LOCATION OF ALL UNDERGROUND UTILITIES SHALL BE VERIFIED AND MARKED IN THE FIELD, PRIOR TO ANY DIGGING OPERATIONS.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING EXISTING TREES AND PLANT MATERIAL WITHIN THE AREA OF PROPOSED IMPROVEMENTS.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSING OF ALL DEBRIS OFF-SITE, CLEAN-UP OF ALL PAVED AREAS (ROADWAYS, SIDEWALKS, ETC.); AND RESTORATION OF ALL DISTURBED LAWN AREAS.
7. CONTRACTOR SHALL BE RESPONSIBLE TO REPAIR ANY DAMAGE TO UNDERGROUND UTILITIES DAMAGED.
8. CONTRACTOR SHALL PROVIDE SCREENED PLANTING SOIL WHERE PLANTING IS TO OCCUR. 36" DEPTH, 6" DEPTH AT LAWN AREAS.
9. FOLLOWING COMPLETION OF ALL PLANTING INSTALLATION WORK, THE CONTRACTOR SHALL BE REQUIRED TO RESTORE ALL DISTURBED LAWN AREAS.
10. NO TREE SHALL BE PLANTED CLOSER THAN 10 FEET FROM AN UNDERGROUND UTILITY.
11. ALL LINES ARE PARALLEL OR PERPENDICULAR UNLESS SHOWN OTHERWISE.
12. VERIFY LAYOUT OF ALL PROPOSED WORK TO EXISTING CONDITIONS. REPORT DISCREPANCIES BEFORE ANY CLEARING OR EXCAVATION IS DONE.
13. PROVIDE STAKED LAYOUT ON SITE FOR OWNER AND LANDSCAPE ARCHITECT'S REVIEW PRIOR TO COMMENCING WORK.
14. ALL DIMENSIONS SHOWN ARE TO FACE OF MATERIALS, UNLESS SHOWN OTHERWISE.
15. PLEASE NOTE, CLIENT DID NOT RETAIN STUART AND ASSOCIATES, LLC.. TO PROVIDE LONG TERM MAINTENANCE SPECIFICATIONS FOR THE LANDSCAPE MATERIAL.
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SPEC NOTES:
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CONTRACTOR NOTES:
1. GENERAL CONTRACTOR TO COORDINATE AND PROVIDE CONDUIT PER LIGHTING SHOWN.
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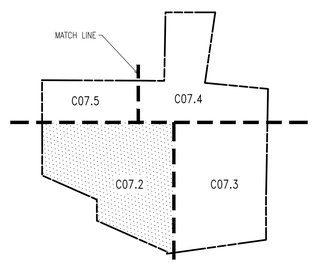

KEY MAP
N.T.S

LANDSCAPE PLAN
SCALE: 1"=50'

50 0 25 50 100
GRAPHIC SCALE
1 inch = 50 feet

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LANDSCAPE ARCHITECTS
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Civil Engineering
Land Planning
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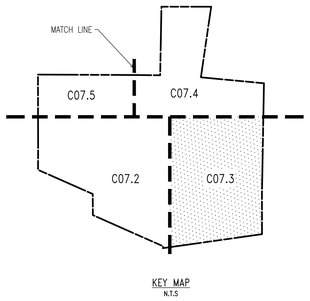
West Chester, PA 19380
Phone: (610) 918-9002
Fax: (610) 918-9003

NO.	DATE	DESCRIPTION
8		
7		
6		
5		
4		
3		
2	6-14-23	PER TOWNSHIP ENGINEER COMMENTS
1		

CONDITIONAL USE
LIGHTING PLAN
CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD
WESTTOWN TWP., CHESTER COUNTY, PA

DATE:	04/17/23
SCALE:	1"=50'
DRAWN BY:	JPL
CHECKED BY:	PJS
PROJECT NO.:	3868
CAD FILE:	20230616_STOKES_TLP.dwg
PLOTTED:	06/14/23
DRAWING NO.:	C07.2
SHEET	30 or 37

Z:\JOBSATE PROJECT FILES\D.L. HOWELL\STOKES PROPERTY – WESTTOWN TOWNSHIP\TOWNSHIP LANDSCAPE PLAN\20230617_STOKES-TLP\20230616_STOKES_TLP.DWG



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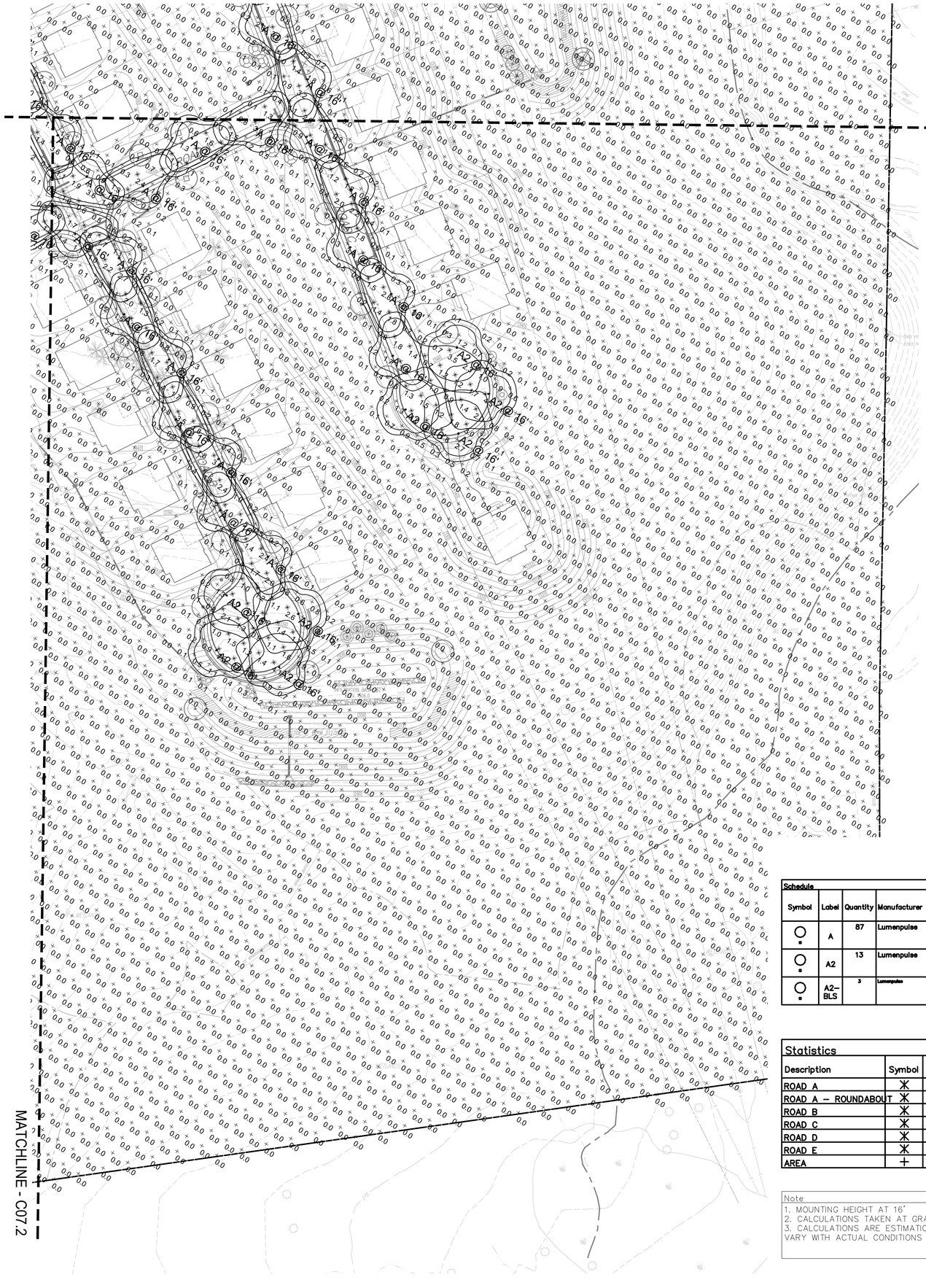

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5. WATTAGE TO BE SELECTED BY CONTRACTOR.

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Schedule

Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Number Lamps	Lumens Per Lamp	Light Loss Factor	Wattage
○ ▪	A	87	Lumenpulse	ALG71(XX)-120/277-CSL-S60-30K-CRI 80-3		1	4910	0.95	55
○ ▪	A2	13	Lumenpulse	ALG71(XX)-120/277-CSL-M80-30K-CRI 80-4		1	5882	0.95	64
○ ▪	A2-BLS	3	Lumenpulse	ALG71(XX)-120/277-CSL-M80-30K-CRI 80-4 BLS	Allegro Small	1	3132	0.95	64

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
ROAD A	✳	2.1 fc	4.3 fc	0.8 fc	5.4:1	2.6:1
ROAD A – ROUNDABOUT	✳	1.4 fc	3.3 fc	0.6 fc	5.5:1	2.3:1
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LANDSCAPE PLAN
SCALE: 1"=50'

50 0 25 50 100
GRAPHIC SCALE
1 inch = 50 feet

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LANDSCAPE ARCHITECTS
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Fax: (610) 918-9003

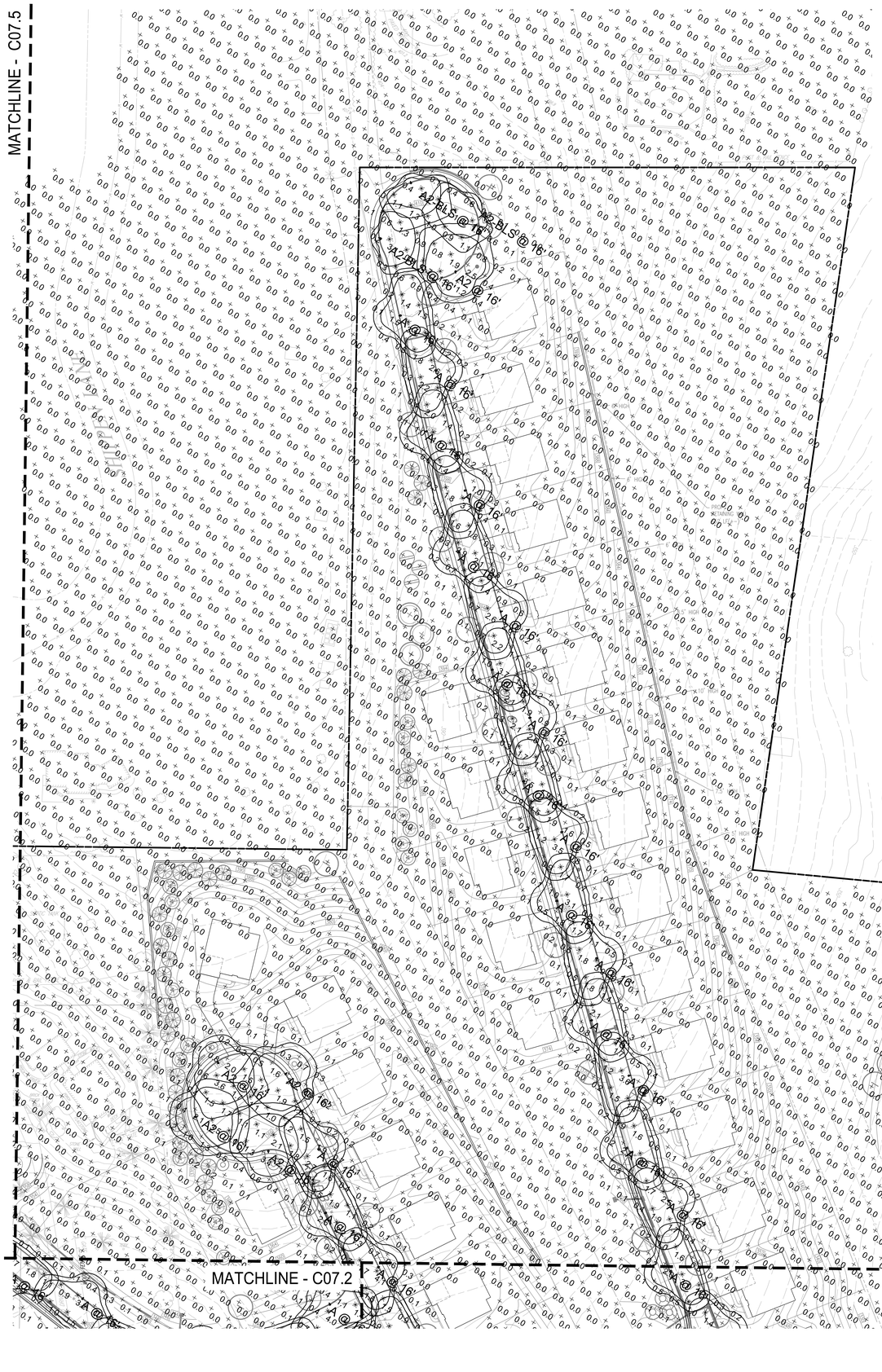
REV	DATE	DESCRIPTION
1	6-14-23	PER TOWNSHIP ENGINEER COMMENTS
2		
3		
4		
5		
6		
7		
8		

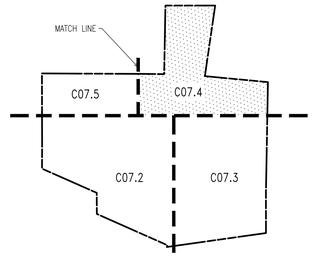
CONDITIONAL USE
LIGHTING PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD
WESTTOWN TWP., CHESTER COUNTY, PA

DATE:	04/17/23
SCALE:	1"=50'
DRAWN BY:	JPL
CHECKED BY:	PJS
PROJECT NO.:	3868
CAD FILE:	20230616_STOKES_TLP.dwg
PLOTTED:	06/14/23
DRAWING NO.:	C07.3
SHEET	31 OF 37

Z:\JOBSITE PROJECT FILES\D.L. HOWELL\STOKES PROPERTY – WESTTOWN TOWNSHIP\TOWNSHIP LANDSCAPE PLAN\20230617_STOKES TLP\20230616_STOKES_TLP.DWG





KEY MAP
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ZONE AE
A SPECIAL FLOOD HAZARD AREA WITH BASE FLOOD ELEVATIONS.

LANDSCAPE PLAN
SCALE: 1"=50'

50 0 25 50 100
GRAPHIC SCALE
1 inch = 50 feet

stuart
LANDSCAPE ARCHITECTS PLANNERS | DESIGNERS

illuminations

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Phone: (610) 918-9002
Fax: (610) 918-9003

COMMONWEALTH OF PENNSYLVANIA PATRICK J. STUART REGISTERED LANDSCAPE ARCHITECT

NO.	DATE	DESCRIPTION
1	6-14-23	PER TOWNSHIP ENGINEER COMMENTS
2		
3		
4		
5		
6		
7		
8		

CONDITIONAL USE
LIGHTING PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD
WESTTOWN TWP., CHESTER COUNTY, PA

DATE:	04/17/23
SCALE:	1"=50'
DRAWN BY:	JPL
CHECKED BY:	PJS
PROJECT NO.:	3868
CAD FILE:	20230616_STOKES_TLP.dwg
PLOTTED:	06/14/23
DRAWING NO.:	C07.4
SHEET	32 OF 37

Z:\JOBS\TO PROJECT FILES\D.L. HOWELL\STOKES PROPERTY - WESTTOWN TOWNSHIP\TOWNSHIP LANDSCAPE PLAN\20230617_STOKES TLP\20230616_STOKES_TLP.DWG

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18. FOLLOWING THE COMPLETION, THE EXISTING VEGETATION WILL BE INSPECTED FOR HEALTH AND QUALITY, AND IF NOT DEEMED IN GOOD CONDITION, REPLACED WITH THE EQUIVALENT COMPENSATORY PLANTINGS.
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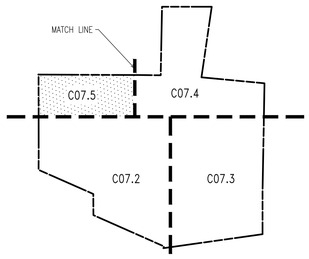

KEY MAP
N.T.S

LANDSCAPE PLAN
SCALE: 1"=40'

50 0 25 50 100
GRAPHIC SCALE
1 inch = 50 feet

stuart
LANDSCAPE ARCHITECTS
PLANNERS | DESIGNERS

illuminations

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West Chester, PA 19380
Phone: (610) 918-9002
Fax: (610) 918-9003

No.	Date	Description
1	6-14-23	PER TOWNSHIP ENGINEER COMMENTS
2		
3		
4		
5		
6		
7		
8		

CONDITIONAL USE
LIGHTING PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD
WESTTOWN TWP., CHESTER COUNTY, PA

DATE:	04/17/23
SCALE:	1"=50'
DRAWN BY:	JPL
CHECKED BY:	PJS
PROJECT NO.:	3868
CAD FILE:	20230616_STOKES_TLP.dwg
PLOTTED:	06/14/23
DRAWING NO.:	C07.5
SHEET	33 OF 37

Z:\JOBS\ATI PROJECT FILES\D.L. HOWELL\STOKES PROPERTY – WESTTOWN TOWNSHIP\TOWNSHIP LANDSCAPE PLAN\20230617_STOKES TLP\20230616_STOKES_TLP.DWG

LIGHTING AND LIGHTING SUBSTITUTION NOTES:

1. EXTERIOR LIGHTING HAS BEEN DESIGNED PER THE LIGHTING HANDBOOK OF THE ENGINEERING SOCIETY OF NORTH AMERICA (IESNA)
2. SELECTED FIXTURES TO BE FULL-CUT AND DARK SKY FRIENDLY.
3. THE TOWNSHIP MAY REQUIRE GLARE SHIELDING DEVICES, AT THE APPLICANT'S EXPENSES, IF DETERMINED APPLICABLE POST CONSTRUCTION.
4. THE TOWNSHIP RESERVES THE RIGHT TO CONDUCT ONE OR MORE POST-INSTALLATION NIGHTTIME INSPECTIONS TO VERIFY COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AND IF APPROPRIATE, TO REQUIRE SUITABLE REMEDIAL ACTION AT NO EXPENSE TO TOWNSHIP.
5. POST-APPROVAL ALTERATIONS TO LIGHTING PLANS OR INTENDED SUBSTITUTION FOR APPROVED LIGHTING EQUIPMENT SHALL BE SUBMITTED TO THE TOWNSHIP FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION.
6. LIGHTING FIXTURES AND EQUIPMENT SHALL BE MAINTAINED SO AS TO CONTINUOUSLY MEET TOWNSHIP REQUIREMENTS.
7. ALL FIXTURES TO BE CONTROLLED WITH WIRELESS CONTROLLERS AND ALL SITE LIGHTING WILL BE REDUCED BY 75% FROM 11PM TO DAWN. NO OTHER LIGHTS SHALL BE PERMITTED AFTER 11PM.
8. ALL 120 VOLT CIRCUITS TO BE INSTALLED BY LICENSED ELECTRICIAN.
9. ALL 120 VOLT CABLE TO BE RUN IN CONDUIT.
10. CONTRACTOR TO PROVIDE SUFFICIENT NIGHTTIME ADJUSTMENT TO ALL LIGHTING TO SATISFY TOWNSHIP REQUIREMENTS AND OWNER OR OWNER'S REPRESENTATIVE.
11. ALL LIGHTING TO BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
12. ALL ELECTRICAL CONDUITS SHALL BE SCH. 40 PVC AND ALL BENDS SHALL BE SWEEP TYPE FOR PULLING WIRE. CONDUIT TO EXTEND BEYOND THE EDGE OF HARDSCAPE ELEMENTS BY 12" MIN. CONDUIT TO BE TEMPORARILY CAPPED AND LOCATIONS STAKED PRIOR TO BACKFILLING.
13. WHILE EXTENDING CONDUITS UNDER EXISTING STRUCTURE THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO EXISTING STRUCTURES.
14. ALL SWITCHING CONTROL DEVICE TYPE AND LOCATIONS TO BE APPROVED BY OWNER OR OWNER'S REPRESENTATIVE.
15. ALL LIGHTING FIXTURES TO BE CONTROLLED BY AUTOMATIC SWITCHES TO PERMIT EXTINGUISHING LIGHT BETWEEN 11PM AND DAWN. ALL-NIGHT SAFETY OR SECURITY LIGHTING SHALL NOT HAVE LIGHTING INTENSITY LEVELS WHICH EXCEED 25% OF THE LEVELS NORMALLY PERMITTED BY THE TOWNSHIP BUT IN NO CASE SHALL THE INTENSITY LEVELS BE LESS THAN THE MINIMUM LEVELS FOR SAFETY AND SECURITY AS INVOKED BY THE IESNA.A11 FINAL LIGHT LOCATIONS TO BE APPROVED BY LANDSCAPE ARCHITECT.
16. CONTRACTOR TO ARRANGE A PRE-CONSTRUCTION MEETING WITH THE OWNER AND OWNER'S REPRESENTATIVES TO DISCUSS ALL UNDERGROUND UTILITIES. AS-BUILT DRAWINGS ARE REQUESTED OF ALL SUCH FACILITIES.
17. CONTRACTOR TO PREPARE A PLAN OF ALL AS-BUILT UNGROUNDED UTILITIES.
18. ALL FINAL LIGHT LOCATIONS TO BE FIELD ADJUSTED, AIMED AS NECESSARY SO AS TO AVOID SHINING OF LIGHT INTO WINDOWS AND DOORS. CONTRACTOR TO ARRANGE PRE-CONSTRUCTION MEETING WITH THE OWNER AND OWNER'S REPRESENTATIVES INCLUDING MASONS AND OTHER INDIVIDUALS FAMILIAR WITH ANY UNDERGROUND FACILITIES.
19. ALL WIRING, UP LIGHTING AND SPOT LIGHT LOCATIONS TO BE COORDINATED WITH TREES ON THE LANDSCAPE PLAN.
20. CONDUIT TRENCHING TO AVOID ROOT ZONES OF EXISTING TREES TO REMAIN.
21. ALL TRENCH LOCATIONS NEAR AND AROUND EXISTING TREES TO BE MARKED AND APPROVED BY LANDSCAPE ARCHITECT PRIOR TO COMMENCEMENT.
22. PROJECT ELECTRICAL ENGINEER TO PROVIDE POWER PLAN.
23. IN THE EVENT THAT THE CONTRACTOR PROPOSES LIGHT FIXTURE SUBSTITUTIONS, REQUEST MUST BE RECEIVED BY THE LANDSCAPE ARCHITECT FOR REVIEW (14) FOURTEEN DAYS PRIOR TO BID DATE TO PROVIDE AMPLE TIME FOR REVIEW AND TO ISSUE AN ADDENDUM INCORPORATING THE SUBSTITUTIONS. FAILURE TO SUBMIT WITHIN THAT DEADLINE RENDERS ALL SUBSTITUTIONS REQUESTS VOID, AND ORIGINALLY SPECIFIED FIXTURE(S) WILL BE SUPPLIED. THE CONTRACTOR SHALL SUBMIT THE FOLLOWING:
   - 23.1. TOWNSHIP REQUIRED COPIES OF ALL MANDATORY SUBMITTALS FOR BOTH THE ORIGINALLY SPECIFIED FIXTURE(S) AND THE PROPOSED SUBSTITUTION(S)
   - 23.2. CONTRACTOR'S WRITTEN CERTIFICATION THAT THE PROPOSED SUBSTITUTION(S) CONFORM TO ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS IN EVERY RESPECT AND IS APPROPRIATE FOR THE APPLICATION INDICATED IN THE DOCUMENTS.
   - 23.3. CONTRACTOR'S WRITTEN STATEMENT INDICATING THE EFFECT OF THE SUBSTITUTION(S) ON THE CONSTRUCTION SCHEDULE COMPARED TO THE SCHEDULE WITH THE ORIGINALLY SPECIFIED FIXTURE(S).
   - 23.4. CONTRACTOR-NET UNIT PRICE FOR THE ORIGINALLY SPECIFIED FIXTURE(S) AND FOR THE PROPOSED SUBSTITUTE FIXTURE(S).
   - 23.5. ONE SAMPLE OF THE PROPOSED SUBSTITUTION FIXTURE(S) WITH SPECIFIED LAMPS AND CORD AND PLUG CONNECTION FOR 277 VOLT OPERATIONS.
   - 23.6. CONTRACTOR'S WRITTEN CERTIFICATION THAT ANY ALTERATIONS THAT MAY RESULT FROM THE PROPOSED LIGHTING FIXTURE SUBSTITUTION(S) WILL BE DESIGNED AND CONSTRUCTED AT THE CONTRACTOR'S EXPENSE.
   - 23.7. REIMBURSEMENT TO THE LANDSCAPE ARCHITECT FOR ALL TIME ASSOCIATED WITH REVIEW OF FIXTURE SUBSTITUTIONS. PAYMENT SHALL BE MADE IN ADVANCE OF THE REVIEW, BASED ON THE LANDSCAPE ARCHITECT'S HOURLY RATES FOR THE PERSONAL INVOLVED IN THE REVIEW.
   - 23.8. CONTRACTOR'S WRITTEN WAIVER OF RIGHTS TO ADDITIONAL PAYMENT AND/OR TIME THAT MAY BECOME NECESSARY SHOULD THE PROPOSED SUBSTITUTION(S) FAIL TO PERFORM IN A MANNER THAT IS EQUIVALENT TO THE ORIGINALLY SPECIFIED FIXTURE(S).
   - 23.9. AS NOTED ABOVE, AN ADDENDUM INCORPORATING THE SUBSTITUTION SHALL INCORPORATE THE FOLLOWING REQUIREMENTS.
     - 23.9.1. ANY SUBSTITUTIONS TO LIGHTING FIXTURES AND THEIR PARTS MUST BE APPROVED BY THE OWNER, TENANT, TOWNSHIP, AND THE LANDSCAPE ARCHITECT. ANY COST ASSOCIATED WITH REVIEW AND APPROVAL OF THE SUBSTITUTIONS SHALL BE ENTIRELY BORNE BY THE CONTRACTOR.
     - 23.9.2. COMPUTER PREPARED LIGHTING PLANS AND PHOTOMETRIC LAYOUTS OF THE PROPOSED LIGHTING AREA WHICH INDICATES THE SYSTEM'S PERFORMANCE.
     - 23.9.3. A PHOTOMETRIC STUDY WITH REPORT NUMBER, DATE, FIXTURE CATALOG NUMBER, LUMINAIRE AND LAMP SPECIFICATIONS; IES CALCULATIONS, POINT BY POINT FOOT CANDLE PLAN, STATISTIC ZONES SHOWING AVERAGE, MAXIMUM, MINIMUM AND UNIFORMITY RATIOS, SUMMARY, ISOLUX PLOT, AND CATALOGUE CUTS. CATALOGUE CUTS MUST IDENTIFY OPTICS, LAMP TYPE, DISTRIBUTION TYPE, REFLECTOR, LENS, BALLASTS, WATTAGE, VOLTAGE, FINISH HOUSING DESCRIPTION AND ALL OTHER PERTINENT INFORMATION.
     - 23.9.4. POLE MANUFACTURER AASHTO CALCULATIONS INDICATING THE POLE AND ANCHOR BOLTS BEING SUBMITTED ARE CAPABLE OF SUPPORTING THE POLE AND FIXTURE SYSTEMS BEING UTILIZED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
     - 23.9.5. A PHOTOGRAPH THAT CLEARLY ILLUSTRATES THE REPLACEMENT FIXTURE MOUNTED NOTING THE COLOR, FINISH, MANUFACTURER, AND ADDITIONAL PHYSICAL CHARACTERISTICS.

SPEC NOTES:
1. POST LIGHT TO BE INSTALLED ON MATCHING FINISH POLE.
2. FINISH/COLOR : BLACK
3. MOUNTING HEIGHT : 16'
4. SEE PLAN/SCHEDULE FOR DISTRIBUTION TYPE.
5. WATTAGE TO BE SELECTED BY CONTRACTOR.

CONTRACTOR NOTES:
1. GENERAL CONTRACTOR TO COORDINATE AND PROVIDE CONDUIT PER LIGHTING SHOWN.
2. CONTRACTOR TO PROVIDE LIGHTING SUBMITTAL FOR FINAL APPROVAL BY OWNER AND LANDSCAPE ARCHITECT.
3. REFER TO MANUFACTURER FOR INSTALLATION INSTRUCTIONS.

SITE PLAN NOTES:

1. ALL LINES AND GRADE WORK NOT PRESENTLY ESTABLISHED AT THE SITE SHALL BE LAID OUT BY A REGISTERED LAND SURVEYOR OR PROFESSIONAL CIVIL ENGINEER EMPLOYED BY THE CONTRACTOR IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
2. THIS PLAN TO BE USED FOR LANDSCAPING AND SITE IMPROVEMENT PURPOSED ONLY.
3. PLANS CREATED FROM DRAWINGS FROM DL HOWELL ENGINEERING DATED, 04/12/2023.
4. LOCATION OF ALL UNDERGROUND UTILITIES SHALL BE VERIFIED AND MARKED IN THE FIELD, PRIOR TO ANY DIGGING OPERATIONS.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING EXISTING TREES AND PLANT MATERIAL WITHIN THE AREA OF PROPOSED IMPROVEMENTS.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSING OF ALL DEBRIS OFF-SITE, CLEAN-UP OF ALL PAVED AREAS (ROADWAYS, SIDEWALKS, ETC.); AND RESTORATION OF ALL DISTURBED LAWN AREAS.
7. CONTRACTOR SHALL BE RESPONSIBLE TO REPAIR ANY DAMAGE TO UNDERGROUND UTILITIES DAMAGED.
8. CONTRACTOR SHALL PROVIDE SCREENED PLANTING SOIL WHERE PLANTING IS TO OCCUR. 36" DEPTH. 6" DEPTH AT LAWN AREAS.
9. FOLLOWING COMPLETION OF ALL PLANTING INSTALLATION WORK, THE CONTRACTOR SHALL BE REQUIRED TO RESTORE ALL DISTURBED LAWN AREAS.
10. NO TREE SHALL BE PLANTED CLOSER THAN 10 FEET FROM AN UNDERGROUND UTILITY.
11. ALL LINES ARE PARALLEL OR PERPENDICULAR UNLESS SHOWN OTHERWISE.
12. VERIFY LAYOUT OF ALL PROPOSED WORK TO EXISTING CONDITIONS. REPORT DISCREPANCIES BEFORE ANY CLEARING OR EXCAVATION IS DONE.
13. PROVIDE STAKED LAYOUT ON SITE FOR OWNER AND LANDSCAPE ARCHITECT'S REVIEW PRIOR TO COMMENCING WORK.
14. ALL DIMENSIONS SHOWN ARE TO FACE OF MATERIALS, UNLESS SHOWN OTHERWISE.
15. PLEASE NOTE, CLIENT DID NOT RETAIN STUART AND ASSOCIATES, LLC.. TO PROVIDE LONG TERM MAINTENANCE SPECIFICATIONS FOR THE LANDSCAPE MATERIAL.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING PA ONE CALL AND LOCATING ALL UNDERGROUND UTILITIES BEFORE ANY DIGGING OR PLANT REMOVAL OCCURS.
17. CONTRACTOR SHALL INSTALL SILT FENCE IN ANY AREAS WHERE SOIL MAY RUNOFF INTO PARKING AREAS OR INTO EXISTING INLETS.
18. FOLLOWING THE COMPLETION, THE EXISTING VEGETATION WILL BE INSPECTED FOR HEALTH AND QUALITY, AND IF NOT DEEMED IN GOOD CONDITION, REPLACED WITH THE EQUIVALENT COMPENSATORY PLANTINGS.
19. V.I.F. = VERIFY IN FIELD.

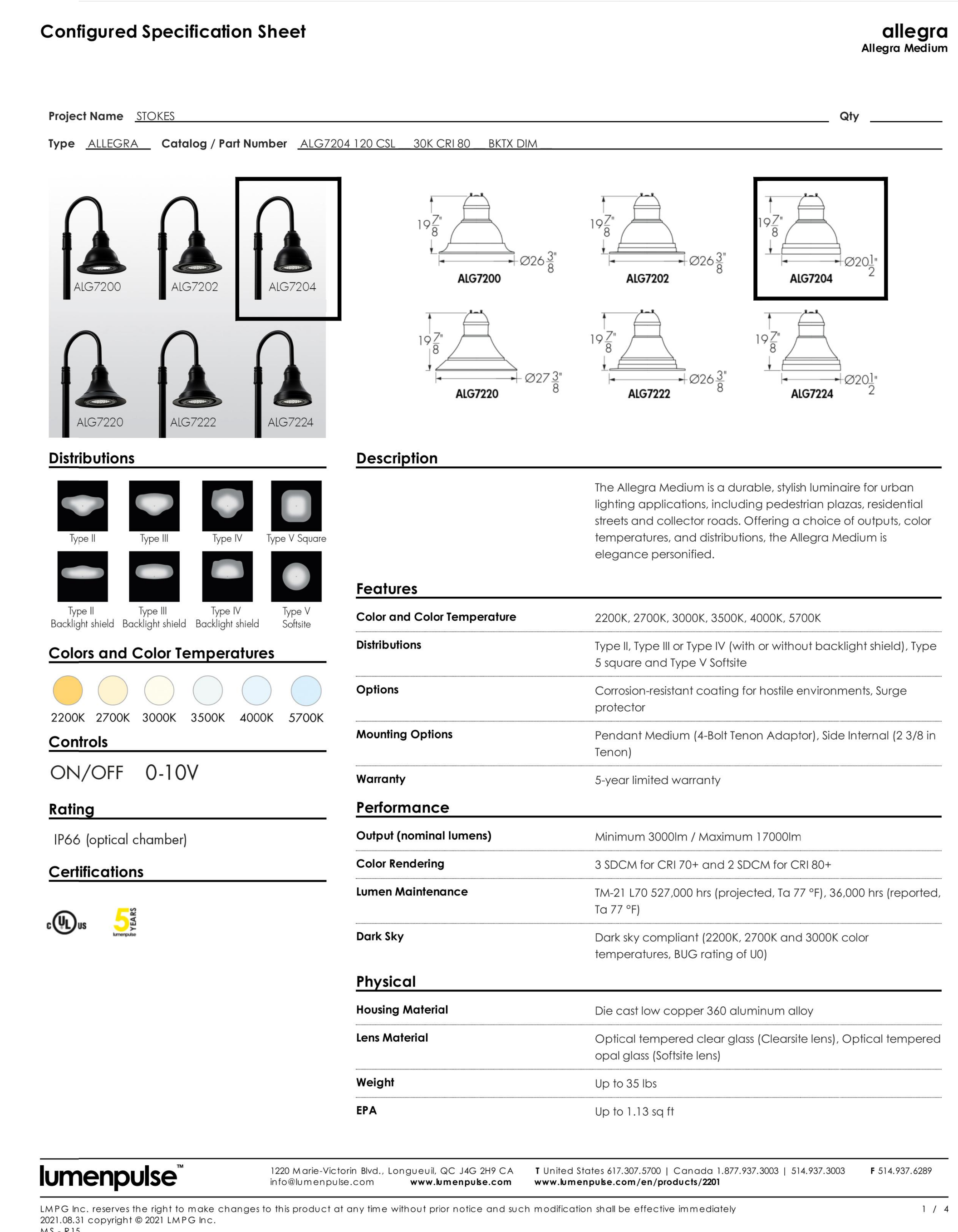
Schedule

Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Number Lamps	Lumens Per Lamp	Light Loss Factor	Wattage
○	A	87	Lumenpulse	ALG71(XX)-120/277-CSL-S60-30K-CRI 80-3		1	4910	0.95	55
○	A2	13	Lumenpulse	ALG71(XX)-120/277-CSL-M80-30K-CRI 80-4		1	5882	0.95	64
○	A2-BLS	3	Lumenpulse	ALG71(XX)-120/277-CSL-M80-30K-CRI 80-4 BLS	Allegra Small	1	3132	0.95	64

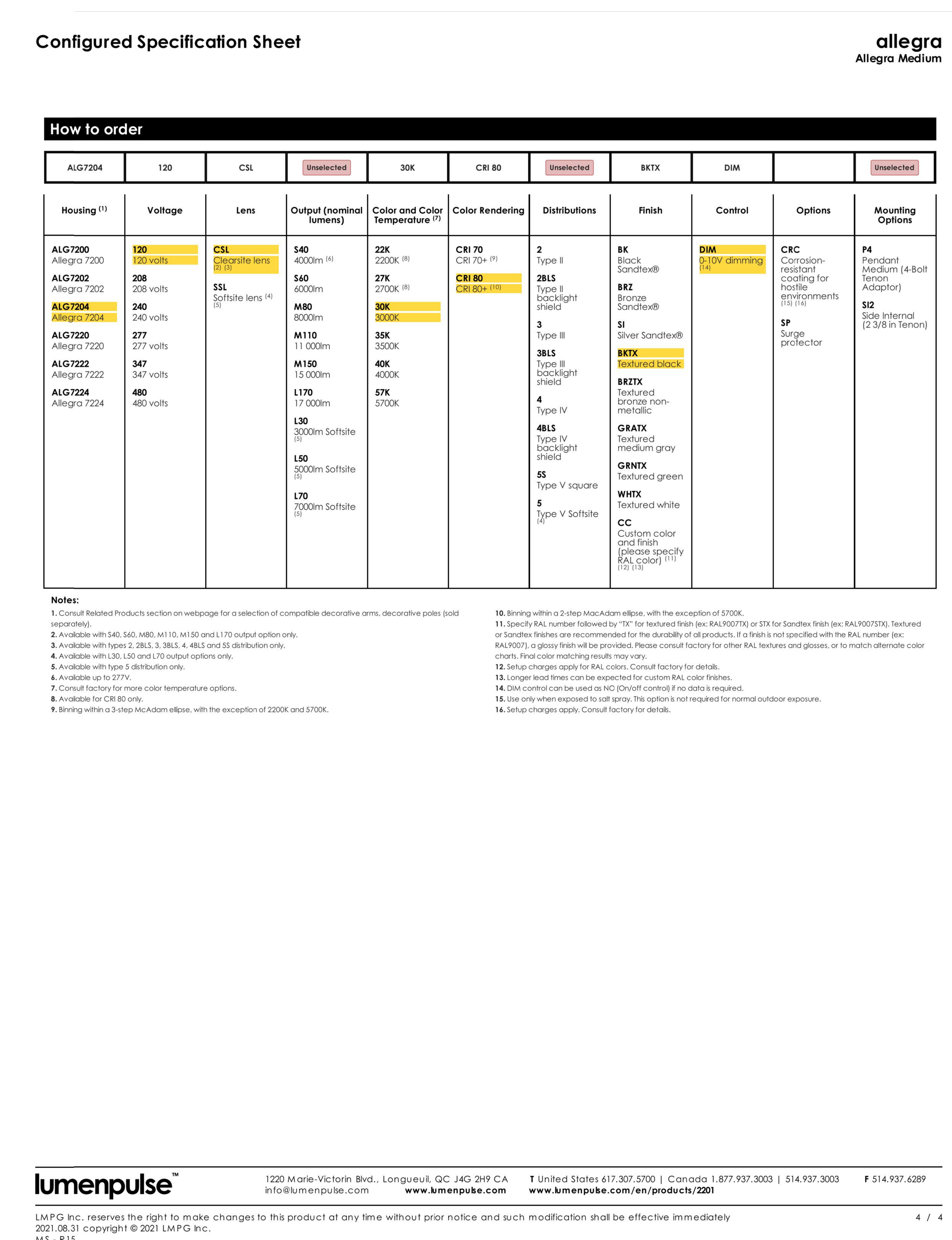
Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
ROAD A	⋇	2.1 fc	4.3 fc	0.8 fc	5.4:1	2.6:1
ROAD A - ROUNDABOUT	⋇	1.4 fc	3.3 fc	0.6 fc	5.5:1	2.3:1
ROAD B	⋇	1.6 fc	3.9 fc	0.7 fc	5.6:1	2.3:1
ROAD C	⋇	1.8 fc	4.5 fc	0.5 fc	9.0:1	3.6:1
ROAD D	⋇	1.8 fc	4.3 fc	0.5 fc	8.6:1	3.6:1
ROAD E	⋇	1.6 fc	4.0 fc	0.6 fc	6.7:1	2.7:1
AREA	+	0.1 fc	4.5 fc	0.0 fc	N/A	N/A

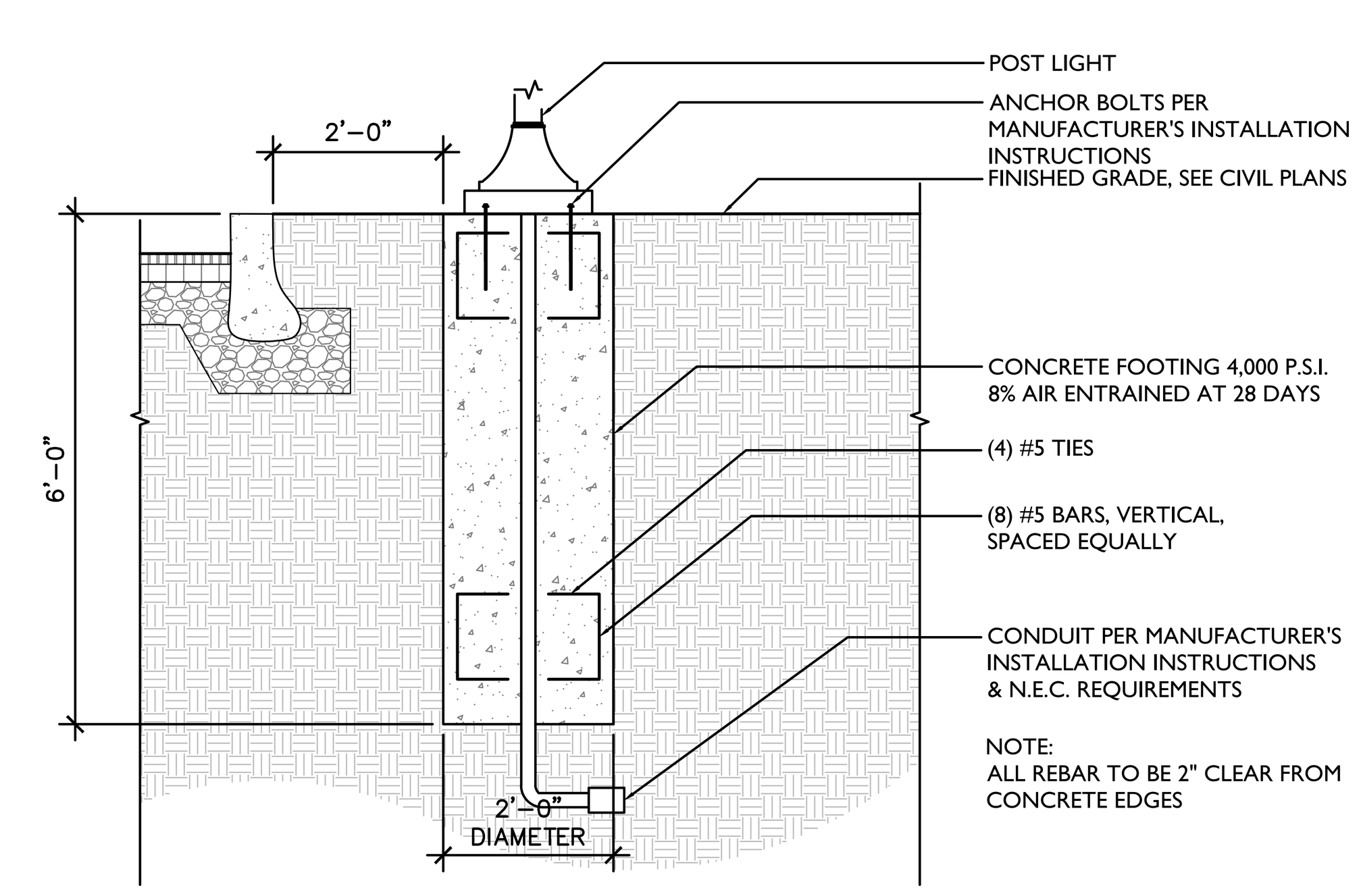
Note
1. MOUNTING HEIGHT AT 16'
2. CALCULATIONS TAKEN AT GRADE
3. CALCULATIONS ARE ESTIMATIONS BASED ON THE INFORMATION PROVIDED AND MAY VARY WITH ACTUAL CONDITIONS



2 POST LIGHT CUTSHEET
SCALE : N.T.S.



3 POST LIGHT CUTSHEET CONT.
SCALE : N.T.S.



1 POST LIGHT FOOTING DETAIL, TYP.
SCALE : 1/2" = 1'-0"

stuart
LANDSCAPE ARCHITECTS
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2 illuminations

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REV.	DATE	DESCRIPTION
1	6-14-23	PER TOWNSHIP ENGINEER COMMENTS
2		
3		
4		
5		
6		
7		
8		

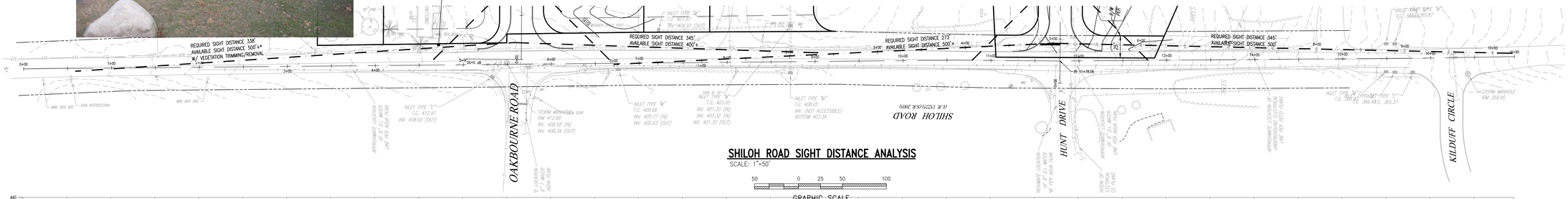
CONDITIONAL USE
LIGHTING DETAILS AND NOTES

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD WESTTOWN TWP., CHESTER COUNTY, PA

DATE:	04/17/23
SCALE:	VARIES
DRAWN BY:	JPL
CHECKED BY:	PJS
PROJECT NO.:	3868
CAD FILE:	20230616_STOKES_TLP.dwg
PLOTTED:	06/14/23
DRAWING NO.:	C07.6
SHEET	34 OF 37

VEGETATION AND SHRUB TRIMMING/REMOVAL IS NEEDED TO MAINTAIN REQUIRED SIGHT DISTANCE

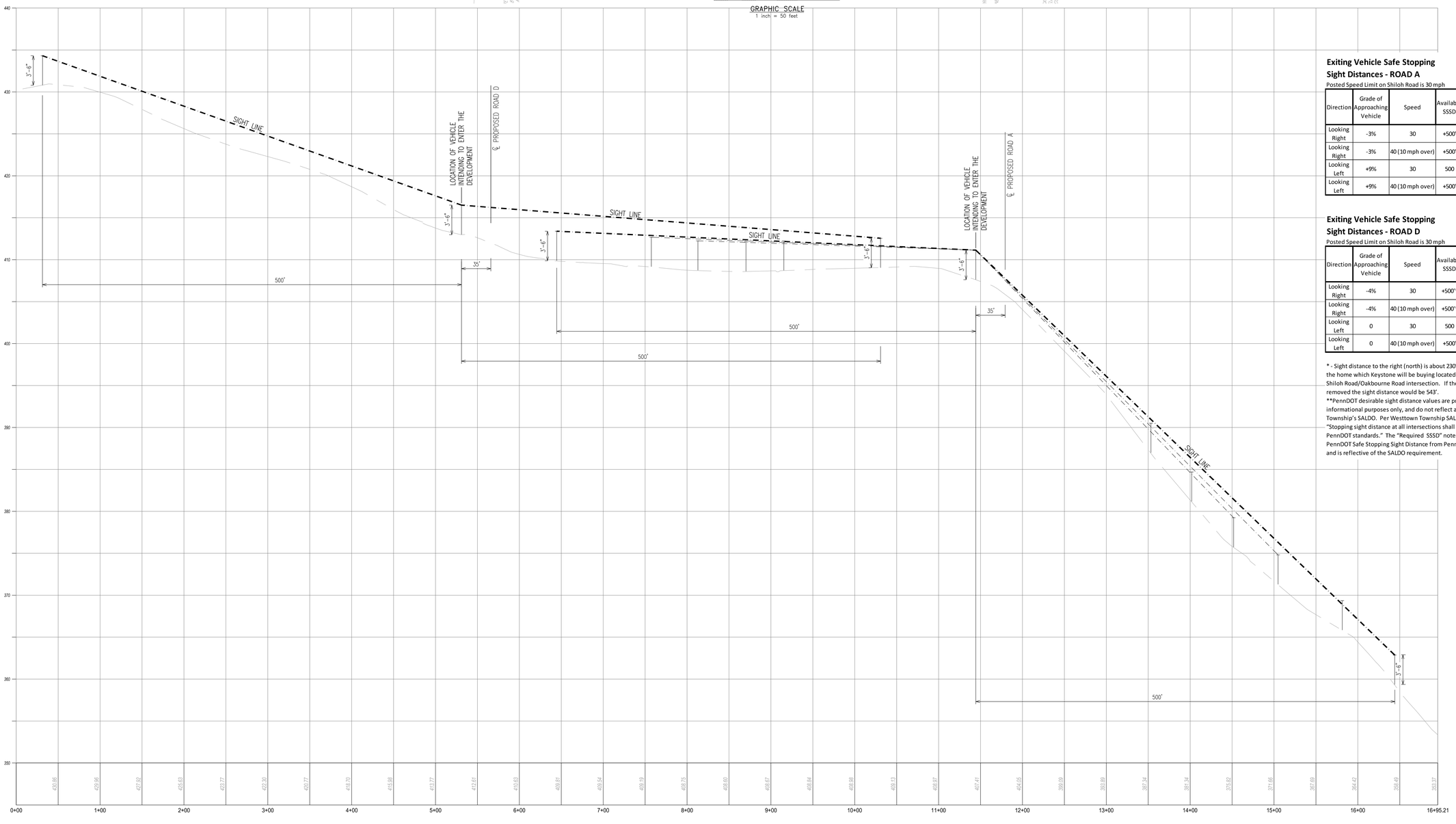
GENERAL NOTE:
TOPOGRAPHY AND PHYSICAL IMPROVEMENTS SHOWN ALONG SHILOH ROAD AND LITTLE SHILOH ROAD ARE FROM FIELD SURVEY BY HOWELL KLINE SURVEYING, LLC. PERFORMED JULY 26TH AND 28TH 2021, & JANUARY 2023.



SHILOH ROAD SIGHT DISTANCE ANALYSIS

SCALE: 1"=50'

GRAPHIC SCALE
50 0 25 50 100
1 inch = 50 feet



SHILOH ROAD CENTERLINE PROFILE
HORIZ SCALE: 1"=50'
VERT SCALE: 1"=5'

Exiting Vehicle Safe Stopping Sight Distances - ROAD A

Posted Speed Limit on Shiloh Road is 30 mph

Direction	Grade of Approaching Vehicle	Speed	Available SSSD	Required SSSD	PennDOT Desirable SSSD**
Looking Right	-3%	30	+500'	204'	273'
Looking Right	-3%	40 (10 mph over)	+500'	331'	460'
Looking Left	+9%	30	500	178'	360'
Looking Left	+9%	40 (10 mph over)	+500'	277'	538'

Exiting Vehicle Safe Stopping Sight Distances - ROAD D

Posted Speed Limit on Shiloh Road is 30 mph

Direction	Grade of Approaching Vehicle	Speed	Available SSSD	Required SSSD	PennDOT Desirable SSSD**
Looking Right	-4%	30	+500'*	207	273'
Looking Right	-4%	40 (10 mph over)	+500'*	338	460'
Looking Left	0	30	500	196	360'
Looking Left	0	40 (10 mph over)	+500'	314	538'

*- Sight distance to the right (north) is about 230' due to shrubbery at the home which Keystone will be buying located at the NE corner of the Shiloh Road/Oakbourne Road intersection. If the shrubbery were removed the sight distance would be 543'.

**PennDOT desirable sight distance values are provided for informational purposes only, and do not reflect a requirement per the Township's SALDO. Per Westtown Township SALDO Section 149-908.C. "Stopping sight distance at all intersections shall be in accordance with PennDOT standards." The "Required SSSD" noted on the table is the PennDOT Safe Stopping Sight Distance from PennDOT Chapter 441.8.(h) and is reflective of the SALDO requirement.

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REV.	DATE	DESCRIPTION
1	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
2		
3		
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6		
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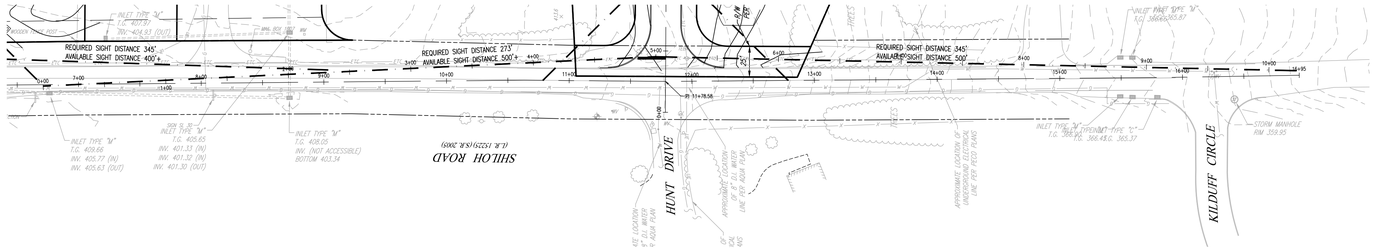
CONDITIONAL USE

SHILOH ROAD SIGHT DISTANCE ANALYSIS

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	3868 Pr.dwg
PLOTTED:	06/15/23
DRAWING NO.:	SD-1.1
SHEET	35 of 38

GENERAL NOTE:
TOPOGRAPHY AND PHYSICAL IMPROVEMENTS SHOWN ALONG SHILOH ROAD AND LITTLE SHILOH ROAD ARE FROM FIELD SURVEY BY HOWELL KLINE SURVEYING, LLC. PERFORMED JULY 26TH AND 28TH 2021, & JANUARY 2023.

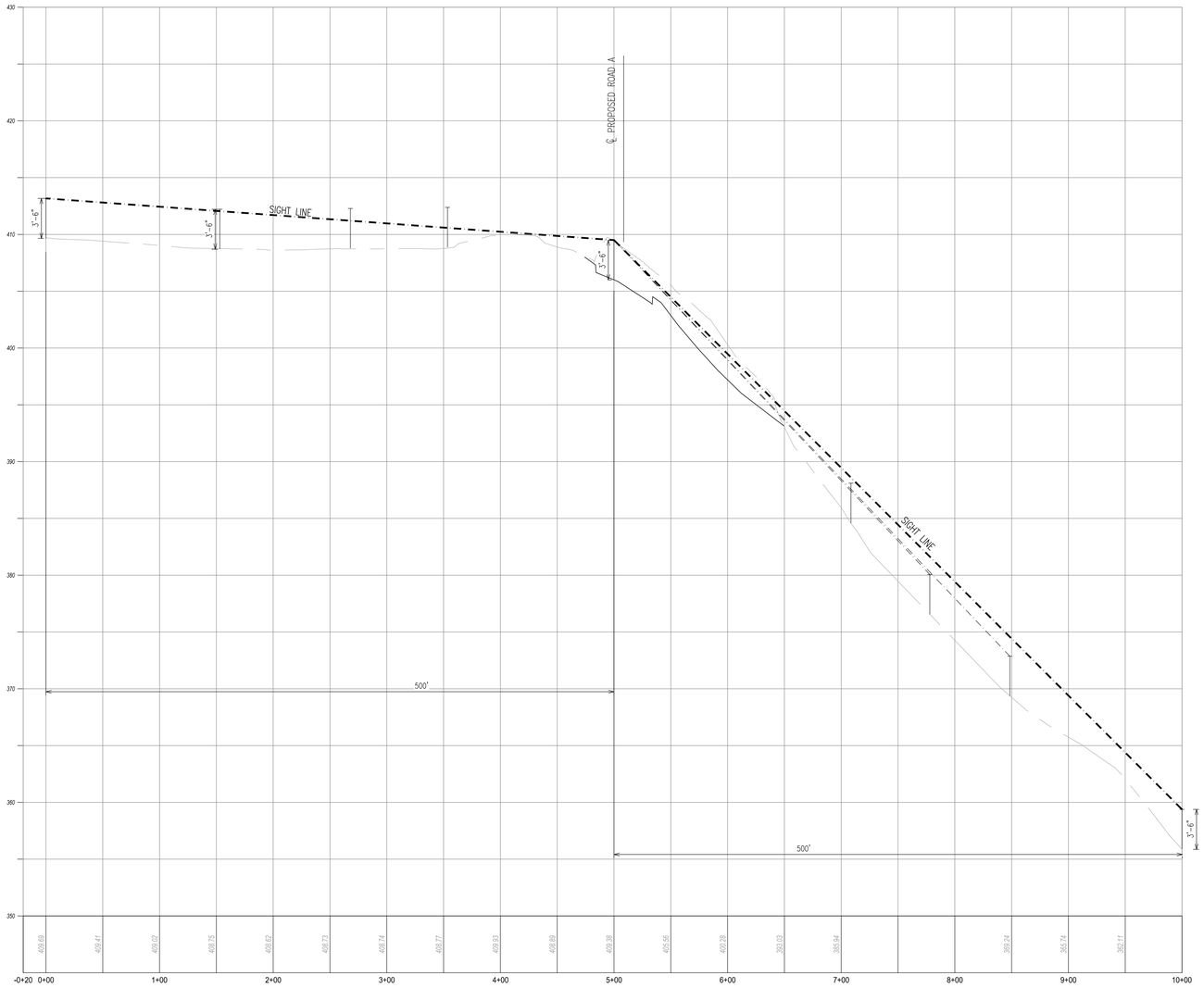


SHILOH ROAD SIGHT DISTANCE ANALYSIS

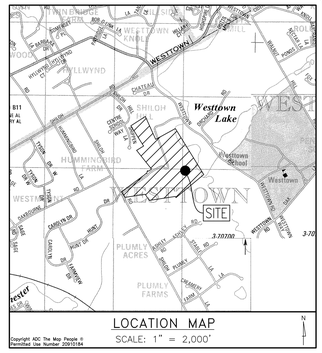
SCALE: 1"=50'

50 0 25 50 100

GRAPHIC SCALE
1 inch = 50 feet



SIGHT DISTANCE ROAD A @ SHILOH PROFILE
HORIZ SCALE: 1"=50'
VERT SCALE: 1"=5'



Exiting Vehicle Safe Stopping Sight Distances - ROAD A

Posted Speed Limit on Shiloh Road is 30 mph

Direction	Grade of Approaching Vehicle	Speed	Available SSSD	Required SSSD	PennDOT Desirable SSSD**
Looking Right	-3%	30	+500'	204'	273'
Looking Right	-3%	40 (10 mph over)	+500'	331'	460'
Looking Left	+9%	30	500	178'	360'
Looking Left	+9%	40 (10 mph over)	+500'	277'	538'

Exiting Vehicle Safe Stopping Sight Distances - ROAD D

Posted Speed Limit on Shiloh Road is 30 mph

Direction	Grade of Approaching Vehicle	Speed	Available SSSD	Required SSSD	PennDOT Desirable SSSD**
Looking Right	-4%	30	+500'*	207	273'
Looking Right	-4%	40 (10 mph over)	+500'*	338	460'
Looking Left	0	30	500	196	360'
Looking Left	0	40 (10 mph over)	+500'	314	538'

* - Sight distance to the right (north) is about 230' due to shrubbery at the home which Keystone will be buying located at the NE corner of the Shiloh Road/Oakbourne Road intersection. If the shrubbery were removed the sight distance would be 543'.
**PennDOT desirable sight distance values are provided for informational purposes only, and do not reflect a requirement per the Township's SALDO. Per Westtown Township SALDO Section 149-908.C. "Stopping sight distance at all intersections shall be in accordance with PennDOT standards." The "Required SSSD" noted on the table is the PennDOT Safe Stopping Sight Distance from PennDOT Chapter 441.8.(h) and is reflective of the SALDO requirement.

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NO.	REV.	DATE	DESCRIPTION
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2			
1	1	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS

CONDITIONAL USE
SHILOH ROAD SIGHT DISTANCE ANALYSIS
CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=50'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	3868 Pr.dwg
PLOTTED:	06/15/23
DRAWING NO.:	SD-1.2
SHEET	36 OF 38

GENERAL NOTES:

1. THE PURPOSE OF THIS PLAN IS TO DEPICT A POSSIBLE ALTERNATIVE PLAN IN ORDER TO SAVE THE HISTORIC HOME. THE TOTAL PROPOSED LOTS WOULD STILL BE 85 TOTAL LOTS INCLUDING THE EXISTING HISTORIC HOME.

LEGEND

- EX. PROPERTY LINE
- PROP. PROPERTY LINE
- EX. RIGHT-OF-WAY
- PROP. RIGHT-OF-WAY
- EX. MONUMENT
- PROP. MONUMENT
- EX. IRON PIPE
- PROP. IRON PIPE
- EX. EASEMENT
- PROP. EASEMENT
- EX. WETLANDS
- EXISTING CONTOUR
- [242] PROPOSED CONTOUR
- x 123.00 EXISTING SPOT ELEV.
- x 123.00 NEW SPOT ELEV.
- GEO2 SOILS TYPE
- SOILS LINE
- EX. CONC. CURB
- PROP. CONC. CURB
- EX. EDGE OF PAVING
- PROP. EDGE OF PAVING
- EX. LIGHT POLE
- PROP. LIGHT POLE
- EX. FENCE
- EX. MAIL BOX
- EX. SIGN
- PROP. SIGN
- EXIST. PARKING SPACES
- PROP. PARKING SPACES
- (TBR) TO BE REMOVED
- EX. TELE. LINE
- T PROP. TELE. LINE
- EX. ELEC. LINE
- E PROP. ELEC. LINE
- EX. UTILITY POLE
- PROP. UTILITY POLE
- EX. GUY ANCHOR
- EX. GAS LINE
- G PROP. GAS LINE
- EX. GAS VALVE
- G.V. PROP. GAS VALVE
- EX. STORM SEWER LINE
- PROP. STORM SEWER LINE
- EX. STORM INLET
- PROP. STORM INLET
- PROP. STORM INLET ID
- PROP. SEEPAGE BED
- EX. SANITARY SEWER LINE
- S PROP. SAN. SEWER LINE
- L PROP. SAN. SEWER LATERAL
- MH 1 PROP. SANITARY MH. ID
- EX. WATER LINE
- W PROP. WATER LINE
- WL PROP. WATER LATERAL
- FW PROP. FIRE WATER LINE
- EX. WATER VALVE
- W.V. PROP. WATER VALVE
- EX. HYDRANT
- F.H. PROP. HYDRANT
- EX. MANHOLE
- PROP. MANHOLE
- ZONE AE FLOODPLAIN
- 15%-25% SLOPES
- 25%+ SLOPES
- WETLANDS

RESIDENTIAL DEVELOPMENT

ART. VI – R1 RESIDENTIAL DISTRICT
SECT. 170-501.C: CONDITIONAL USES
(2). RESIDENTIAL DEVELOPMENT (FLEXIBLE DEVELOPMENT PROCEDURE – ARTICLE IX)
ART. IX – FLEXIBLE DEVELOPMENT PROCEDURE
SECT. 170-903.: PERMITTED USES
A. SINGLE FAMILY DETACHED DWELLINGS
SEC. 170-904.: DENSITY STANDARDS
BASE DENSITY = 1.1 D.U./ACRE OF TRACT AREA (*SEE TRACT AREA CALCULATION)
BONUS DENSITY = 1.5 D.U./ACRE OF TRACT AREA (MAXIMUM ACHIEVABLE)

AREA AND BULK REGULATIONS	REQUIRED	PROPOSED
MAX. NET RESIDENTIAL DENSITY	4 UNITS/ACRE	3.30 UNITS/ACRE
MIN. DISTANCE FROM CURB	30 FT.	30 FT.
MIN. DISTANCE BETWEEN BUILDINGS	30 FT.	30 FT.
MAX. BUILDING HEIGHT	3 STORIES/38 FT.	<3 STORIES/38 FT.
SETBACK FROM TRACT BOUNDARY	50'	50'

TRACT AREA CALCULATION	
TRACT AREA (GROSS)	3,523,402 S.F. / 80.886 ACS.(±)
EX. LEGAL R/W	4,663 SF.
EX. UTILITY EASEMENTS	260,525 SF.
AREA EQUAL TO 75% OF:	
FLOODPLAIN	– 144,110 S.F.
PROHIBITIVE SLOPES	– 70,941 S.F.
WETLANDS	– 61,077 S.F.
AREA EQUAL TO 25% OF SEASONALLY HIGH WATER TABLE SOILS	– 132,496 S.F.
TRACT AREA =	2,849,590 S.F. (65.418 AC.)
BASE DENSITY (1.1 MULTIPLIER)=	71 LOTS

OPEN SPACE

MINIMUM OPEN SPACE
= 40% GROSS TRACT AREA

REQUIRED
GROSS TRACT = 80.886 ACRES
80.886 ACRES X 40% = 32.35 ACRES

PROPOSED
GROSS OPEN SPACE = 47.62 ACRES (58.87% GROSS TRACT AREA)
QUALIFYING MIN. REQUIRED OPEN SPACE = 32.36 ACRES (40.01% GROSS TRACT AREA)
QUALIFYING INCREMENTAL BONUS O.S. = 12.20 ACRES (15.08% GROSS TRACT AREA)

SEE TABLE BELOW FOR TABULATION

DENSITY CALCULATION

BASE DENSITY: 1.1 D.U. / TRACT AREA

BONUS DENSITY: +0.075 D.U. / 5% OF ADDITIONAL OPEN SPACE = (15.02% EXTRA) = 0.075 * 3 = 0.225 BONUS

MAXIMUM DENSITY = 1.1 + 0.225 = 1.325 D.U. * 65.418 ACS. = 86 LOTS ACHIEVABLE

RESIDENTIAL LOT AREA	25.74 ACRES
PROPOSED LOTS	85
DENSITY	3.30 DU/AC.
AVERAGE SIZE	0.303 ACRES

REQUIRED MINIMUM COMMON OPEN SPACE (40% OF THE GROSS TRACT AREA)

HISTORIC HOME OPEN SPACE PARCEL (INCLUDED AS PART OF THE REQUIRED MINIMUM COMMON OPEN SPACE

INCREMENTAL BONUS OPEN SPACE AREA

NON-QUALIFYING OPEN SPACE (AREAS LESS THAN 75' IN WIDTH & AREAS NOT LESS THAN 0.5 ACRES OF CONTIGUOUS AREA)

OPEN SPACE AREAS WITHIN FLOODPLAIN, WETLANDS, AND STEEP SLOPES GREATER THAN 25%

AREAS USED FOR SUBSURFACE INFILTRATION WITH OPEN STORAGE ACCESSORY TO INFILTRATION FACILITIES

	Min. Required Common Open Space Area (40%)							
	1	2	3	4			TOTAL	
Gross Area (Acres)	19.21	6.58	6.5	0.52			32.81	
- Areas less than 75' in width	0	0	0.31	0			0.31	
- Areas less than 1/2 acre	0	0	0	0			0	
- Non-infiltrating SWM Facilities	0.03	0	0.02	0.02			0.07	
- Pump Station and other miscellaneous impervious	0.07	0	0	0			0.07	% G.T.A.
Qualifying Base Open Space	**19.11**	**6.58**	**6.17**	**0.50**			**32.36**	**40.01%**
Floodplain	2.78	2.28	0	0			5.06	
Area of 25%+ Slopes	1.25	0.57	0.13	0.16			2.11	
Wetland/Waterbodies	1.74	0	0.14	0			1.88	% Base OS
Area of floodplain, wetland, slopes > 25% in Min. Required Common Open Space (Max. 50% allowed)	**5.77**	**2.85**	**0.27**	**0.16**			**9.05**	**27.97%**

	Bonus Open Space Area						
	B1	B2	B3	B4	B5	B6	TOTAL
Gross Area (Acres)	4.58	3.9	1.93	2.32	1	1.08	14.81
- Areas less than 75' in width	0.13	0.49	1.15	0	0	0	1.77
- Areas less than 1/2 acre	0	0		0	0	0	0
- Floodplain	0	0	0	0	0	0	0
- Area of 25%+ Slopes (including proposed)	0	0.27	0	0.24	0	0	0.51
- Wetland/Waterbodies	0	0	0	0	0	0.01	0.01
- Impervious Surfaces	0	0	0	0	0	0	0
- Stormwater Facilities	0.01	0	0.01	0.25	0	0.05	0.32
Qualifying Bonus Open Space	**4.44**	**3.14**	**0.77**	**1.83**	**1.00**	**1.02**	**12.2**

	Bonus % per G.T.A.
	15.08%

AREA AVAILABLE FOR ACTIVE RECREATION

NET TRACT AREA =	2,849,590 S.F.
AREA REQUIRED (10% NET TRACT AREA)	X 10%
	284,959 SF –OR– 6.54 ACRES

AREA SUITABLE FOR ACTIVE RECREATION – 6.61 ACRES

ALTERNATIVE SITE PLAN WITH HISTORIC HOME

SCALE: 1:100_XREF

100 0 50 100 200

GRAPHIC SCALE
1 inch = 100 feet

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NO.	DESCRIPTION	DATE
8		
7		
6		
5		
4		
3		
2	REVISED PER TOWNSHIP CONSULTANT REVIEWS	06/15/23
1		

CONDITIONAL USE
ALTERNATIVE SITE PLAN WITH HISTORIC HOME
CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=100'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	01 SITE PLAN HISTORIC OPTION.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C01.1A
SHEET	37 OF 38

RESIDENTIAL DEVELOPMENT

ART. VI – R1 RESIDENTIAL DISTRICT
SECT. 170-501.C: CONDITIONAL USES
(2). RESIDENTIAL DEVELOPMENT (FLEXIBLE DEVELOPMENT PROCEDURE – ARTICLE IX)
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BASE DENSITY = 1.1 D.U./ACRE OF TRACT AREA (*SEE TRACT AREA CALCULATION)
BONUS DENSITY = 1.5 D.U./ACRE OF TRACT AREA (MAXIMUM ACHIEVABLE)

AREA AND BULK REGULATIONS	REQUIRED	PROPOSED
MAX. NET RESIDENTIAL DENSITY	4 UNITS/ACRE	3.30 UNITS/ACRE
MIN. DISTANCE FROM CURB	30 FT.	30 FT.
MIN. DISTANCE BETWEEN BUILDINGS	30 FT.	30 FT.
MAX. BUILDING HEIGHT	3 STORIES/38 FT.	<3 STORIES/38 FT.
SETBACK FROM TRACT BOUNDARY	50'	50'

TRACT AREA CALCULATION

TRACT AREA (GROSS) 3,523,402 S.F. / 80.886 ACS.(±)	
EX. LEGAL R/W	4,663 SF.
EX. UTILITY EASEMENTS	260,525 SF.
AREA EQUAL TO 75% OF:	
FLOODPLAIN	– 144,110 S.F.
PROHIBITIVE SLOPES	– 70,941 S.F.
WETLANDS	– 61,077 S.F.
AREA EQUAL TO 25% OF SEASONALLY HIGH WATER TABLE SOILS	– 132,496 S.F.
TRACT AREA =	2,849,590 S.F. (65.418 AC.)
BASE DENSITY (1.1 MULTIPLIER)=	71 LOTS

OPEN SPACE

MINIMUM OPEN SPACE
= 40% GROSS TRACT AREA

REQUIRED
GROSS TRACT = 80.886 ACRES
80.886 ACRES X 40% = 32.35 ACRES

PROPOSED
GROSS OPEN SPACE = 47.62 ACRES (58.87% GROSS TRACT AREA)
QUALIFYING MIN. REQUIRED OPEN SPACE = 32.36 ACRES (40.01% GROSS TRACT AREA)
QUALIFYING INCREMENTAL BONUS O.S. = 12.20 ACRES (15.08% GROSS TRACT AREA)

SEE TABLE BELOW FOR TABULATION

DENSITY CALCULATION

BASE DENSITY: 1.1 D.U. / TRACT AREA

BONUS DENSITY: +0.075 D.U. / 5% OF ADDITIONAL OPEN SPACE = (15.08% EXTRA) = 0.075 * 3 = 0.225 BONUS

MAXIMUM DENSITY = 1.1 + 0.225 = 1.325 D.U. * 65.418 ACS. = 86 DWELLING UNITS ACHIEVABLE

PRECAUTIONARY STEEP SLOPES (15-25%)

GROSS TRACT AREA = 80.886 ACS (3,523,402 SF)
25% OF THE GROSS TRACT AREA = 880,850 SF

AREA OF PRECAUTIONARY STEEP SLOPES = 547,921 SF < 25% OF THE TRACT AREA
THEREFORE SECTION 170-402.D.(3)(f) DOES NOT APPLY

REQUIRED MINIMUM COMMON OPEN SPACE (40% OF THE GROSS TRACT AREA)

INCREMENTAL BONUS OPEN SPACE AREA

NON-QUALIFYING OPEN SPACE (AREAS LESS THAN 75' IN WIDTH & AREAS NOT LESS THAN 0.5 ACRES OF CONTIGUOUS AREA, PUMP STATION DRIVE AND STRUCTURE)

OPEN SPACE AREAS WITHIN FLOODPLAIN, WETLANDS, AND STEEP SLOPES GREATER THAN 25%, STORMWATER MANAGEMENT FACILITIES

AREAS USED FOR SUBSURFACE INFILTRATION WITH OPEN STORAGE ACCESSORY TO INFILTRATION FACILITIES

	Min. Required Common Open Space Area (40%)							
	1	2	3	4			TOTAL	
Gross Area (Acres)	19.21	6.58	6.5	0.52			32.81	
- Areas less than 75' in width	0	0	0.31	0			0.31	
- Areas less than 1/2 acre	0	0	0	0			0	
-Non-infiltrating SWM Facilities	0.03	0	0.02	0.02			0.07	
-Pump Station and other miscellaneous impervious	0.07	0	0	0			0.07	% G.T.A.
Qualifying Base Open Space	**19.11**	**6.58**	**6.17**	**0.50**			**32.36**	**40.01%**
Floodplain	2.78	2.28	0	0			5.06	
Area of 25%+ Slopes	1.25	0.57	0.13	0.16			2.11	
Wetland/Waterbodies	1.74	0	0.14	0			1.88	% Base OS
Area of Floodplain, wetland, slopes > 25% in Min. Required Common Open Space (Max. 50% allowed)	**5.77**	**2.85**	**0.27**	**0.16**			**9.05**	**27.97%**

	Bonus Open Space Area							
	B1	B2	B3	B4	B5	B6	TOTAL	
Gross Area (Acres)	4.58	3.9	1.93	2.32	1	1.08	14.81	
- Areas less than 75' in width	0.13	0.49	1.15	0	0	0	1.77	
- Areas less than 1/2 acre	0	0		0	0	0	0	
-Floodplain	0	0	0	0	0	0	0	
-Area of 25%+ Slopes (including proposed)	0	0.27	0	0.24	0	0	0.51	
-Wetland/Waterbodies	0	0	0	0	0.01	0.01	0.01	
-Impervious Surfaces	0	0	0	0	0	0	0	
-Stormwater Facilities	0.01	0	0.01	0.25	0	0.05	0.32	Bonus % per G.T.A.
Qualifying Bonus Open Space	**4.44**	**3.14**	**0.77**	**1.83**	**1.00**	**1.02**	**12.2**	**15.08%**

AREA AVAILABLE FOR ACTIVE RECREATION

NET TRACT AREA =	2,849,590 S.F.
AREA REQUIRED (10% NET TRACT AREA)	X 10%
	284,959 SF -OR- 6.54 ACRES

AREA SUITABLE FOR ACTIVE RECREATION – 6.61 ACRES

ALTERNATIVE SITE PLAN WITH NO LOTS

SCALE: 1:100_XREF

100 0 50 100 200
GRAPHIC SCALE
1 inch = 100 feet

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1	06/15/23	REVISED PER TOWNSHIP CONSULTANT REVIEWS
2		
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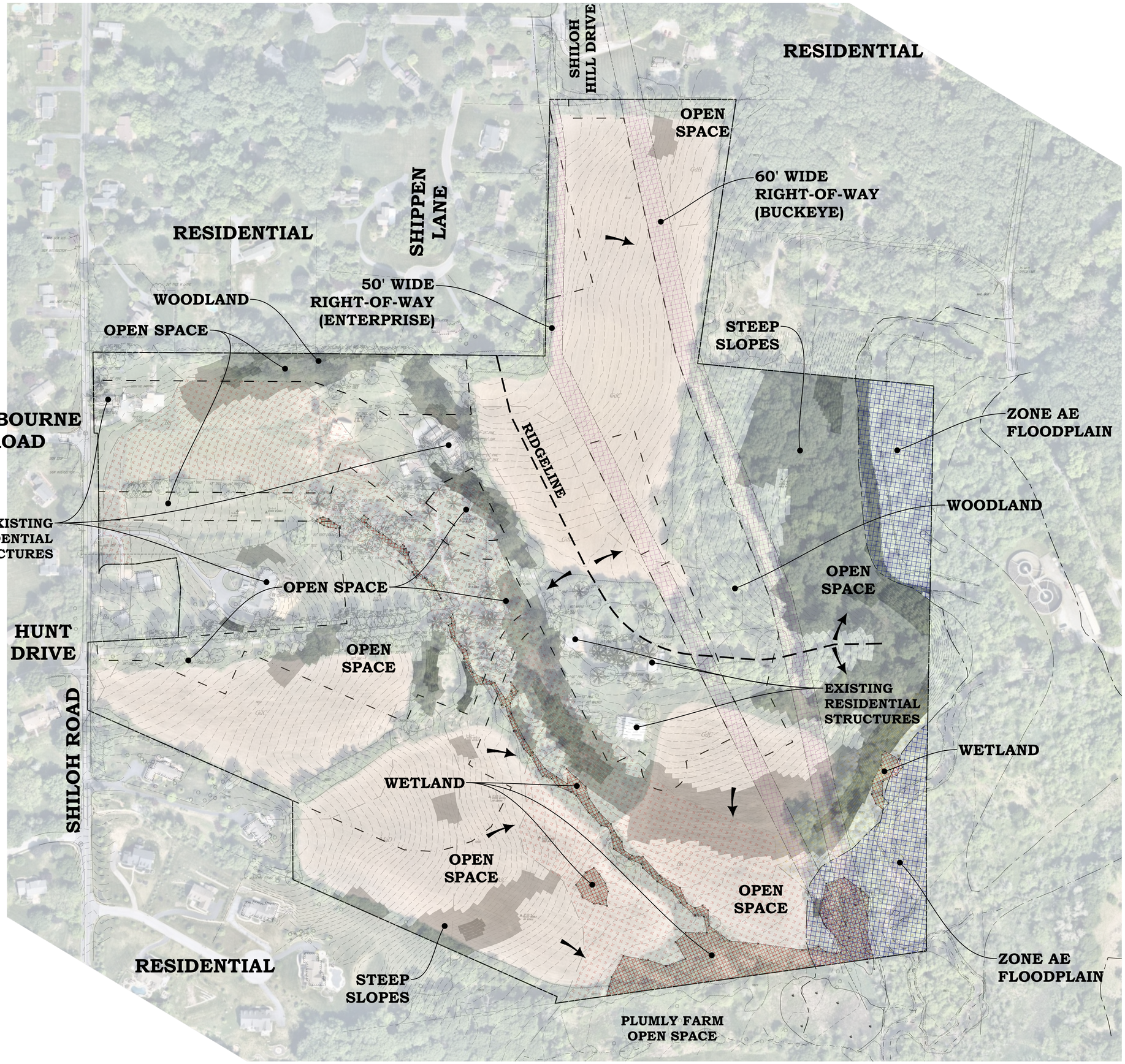
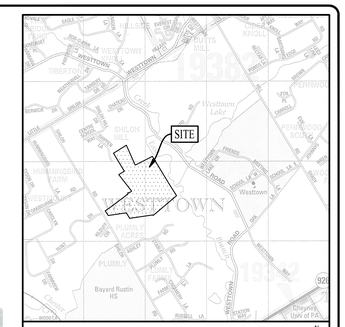
CONDITIONAL USE
ALTERNATIVE SITE PLAN WITH NO LOTS
CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=100'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	01 SITE PLAN No Lots Option.dwg
PLOTTED:	06/15/23
DRAWING NO.:	C01.1B
SHEET	38 of 38



LEGEND

- EX. PROPERTY LINE
- PROP. PROPERTY LINE
- EX. RIGHT-OF-WAY
- EX. EASEMENT
- EX. WETLANDS
- 242 EX. EXISTING CONTOUR
- GEB2 SOILS TYPE
- SOILS LINE
- EX. CONC. CURB
- EX. EDGE OF PAVING
- EX. FENCE
- EX. MAIL BOX
- EX. SIGN
- (TBR) TO BE REMOVED
- EX. TELE. LINE
- EX. ELEC. LINE
- EX. UTILITY POLE
- EX. GUY ANCHOR
- EX. GAS LINE



LOCATION MAP
SCALE: 1" = 2,000'

CONSERVATION DESIGN NARRATIVE

STEP 1 ADD THE FOLLOWING TO THE EXISTING FEATURES PLAN: WETANDS, 100 YEAR FLOODPLAIN, SLOPES 15 TO 25%, SLOPES 25%+. THESE ARE PRIMARY CONSERVATION AREAS.

STEP 2 ADD WOODLANDS, TREELINES, SPECIMEN TREES 18"+, SCENIC VIEWS FROM INSIDE THE SITE, SCENIC VIEWS FROM EXISTING STREETS AND TRAILS, RIDGE LINES. THESE ARE SECONDARY CONSERVATION AREAS. ADD LOCATIONS OF EXISTING FEATURES WITHIN 150', SOILS WITH SEASONAL HIGH WATER TABLE, AND BUILDINGS WITH HISTORIC STRUCTURES AND OPEN SPACES.

STEP 3 ADD AREAS OF OPEN SPACE INTENDED TO REMAIN UN-BUILT.

STEP 4 MAP ALL REMAINING AREAS THAT HAVE POTENTIAL TO BE DEVELOPED.

STEP 5 LAND DEVELOPMENT ACTIVITY SHALL NOT BE PERMITTED WITHIN MORE THAN 50% OF SECONDARY CONSERVATION AREAS. (SEE CALCULATION ON SHT 2 OF 2 OF THE CONSERVATION PLANS)

STEP 6 LAYOUT STREETS AND TRAILS IN POTENTIAL DEVELOPMENT AREAS.

STEP 7 DRAW LOT LINES WITHIN DEVELOPMENT AREAS.

BEDROCK GEOLOGY				
MAP SYMBOL	NAME	AGE	LITH1	LITH2
fgh	Felsic and intermediate gneiss	Precambrian	Felsic gneiss	Intermediate gneiss

Primary Conservation Areas	Acs.	
Floodplain	4.41	
Wetlands	1.83	
Slopes 25%+	2.23	
Slopes 15-25%	12.58	
Total Area	21.05	

Secondary Conservation Areas		
Woodlands, Treelines, Specimen Trees	19.58	
Scenic Views, Ridgelines	0.00	N/A
Scenic View from existing streets	0.00	N/A
Total Area	19.58	

Secondary Conservation Areas Outside of primary*		
Woodlands, Treelines, Specimen Trees	5.56	
Scenic Views, Ridgelines	0.00	N/A
Scenic View from existing streets	0.00	N/A
Total Area	5.56	

*RESOURCES ARE CALCULATED AS OUTSIDE HIGHER CLASS RESOURCES SHOWN ON THE PLANS. RESOURCES DO NOT OVERLAP

LEGEND

- OPEN SPACE LINE
- RIDGE LINE
- STEEP SLOPES 15-25
- STEEP SLOPES 25+
- ZONE AE FLOODPLAIN
- WETLANDS
- PIPELINE EASEMENT
- SOILS WITH SEASONAL HIGH WATER TABLE

FLOODPLAIN NOTE:
A PORTION OF THIS PROPERTY IS LOCATED WITHIN FLOOD HAZARD ZONE AE, A SPECIAL FLOOD HAZARD AREA WITH BASE FLOOD ELEVATIONS PER THE NATIONAL FLOOD INSURANCE RATE MAP FOR CHESTER COUNTY, PA. MAP NO. 42029C0215G, PANEL 215 OF 380, DATED SEPTEMBER 29, 2017. FLOOD PLAIN BOUNDARIES SHOWN HEREON WERE SCALED FROM THE ABOVE MENTIONED MAP.

WETLAND NOTE:
WETLANDS BOUNDARY LINES WERE DELINEATED BY BRICKHOUSE ENVIRONMENTAL, CONSULTANTS AND ENGINEERS AND VORTEX ENVIRONMENTAL AND FLAGS LOCATED BY HOWELL KLINE SURVEYING, LLC. PERFORMED ON OCTOBER 30, 2020 AND JANUARY 2023 RESPECTIVELY.

EXISTING RESOURCES PLAN

SCALE: 1"=100'

100 0 50 100 200

GRAPHIC SCALE
1 inch = 100 feet

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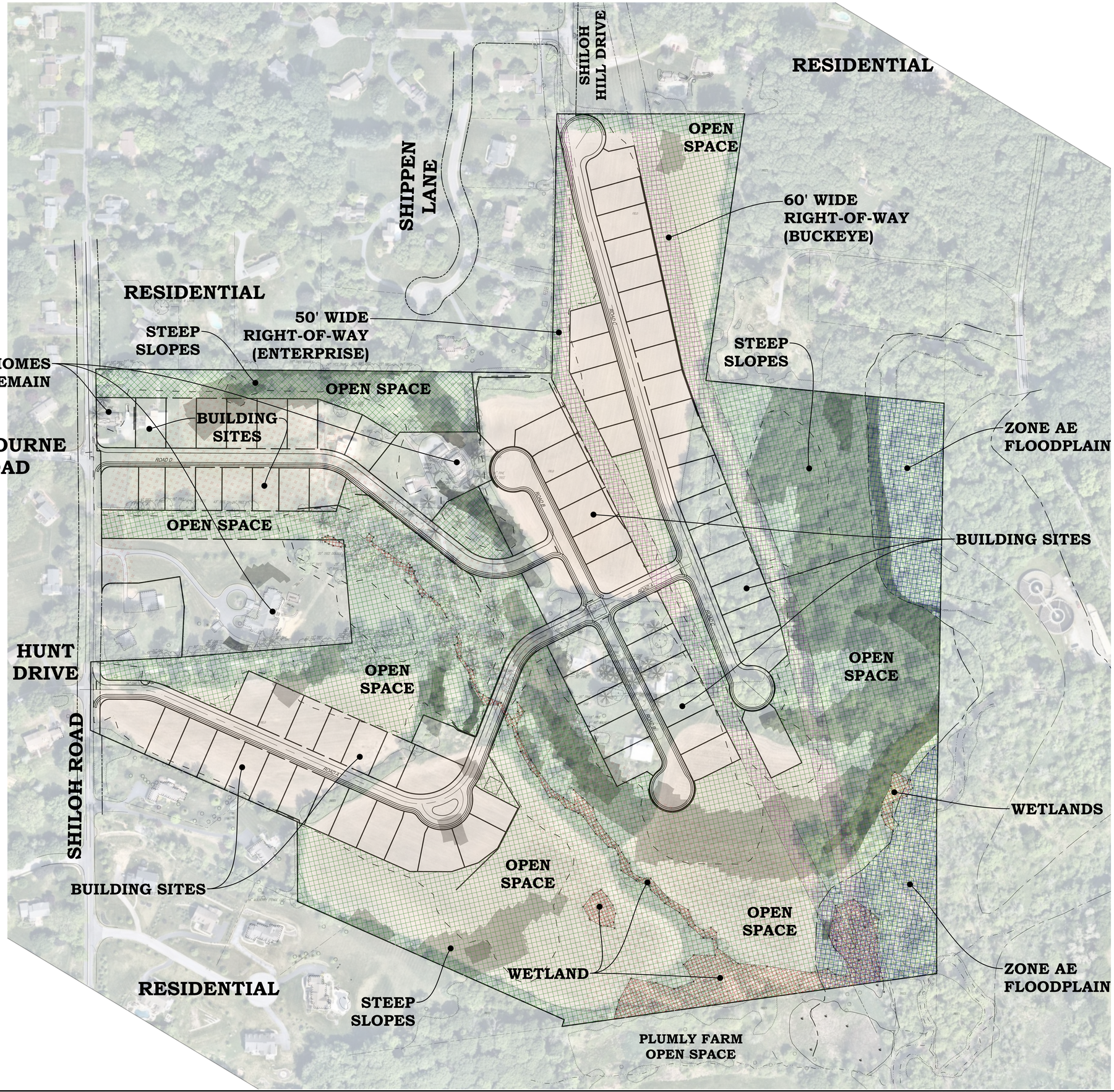
EXISTING RESOURCES PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=100'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	01 Conservation Design Plan.dwg
PLOTTED:	06/15/23
DRAWING NO.:	CP1.1
SHEET	1 OF 2



LEGEND

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- SOILS LINE
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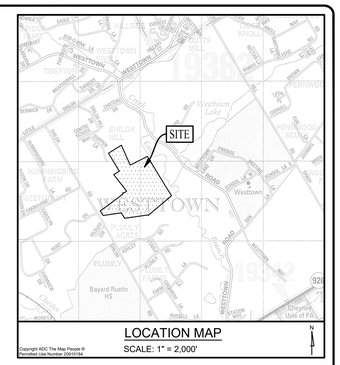

BEDROCK GEOLOGY				
MAP SYMBOL	NAME	AGE	LITH1	LITH2
fgh	Felsic and intermediate gneiss	Precambrian	Felsic gneiss	Intermediate gneiss

Primary Conservation Areas	Acs.	Disturbed Area	% Disturbed
Floodplain	4.41	0	0%
Wetlands	1.83	0.03	2%
Slopes 25%+	2.23	0	0%
Slopes 15-25%	12.58	3.8	30%
Total Area	**21.05**	**3.83**	**18%**

Secondary Conservation Areas		Disturbed Area	% Disturbed	
Woodlands, Treelines, Specimen Trees	19.58	5.62	29%	
Scenic Views, Ridgelines	0.00	0	0%	N/A
Scenic View from existing streets	0.00	0	0%	N/A
Total Area	**19.58**	**5.62**	**29%**	

Secondary Conservation Areas Outside of primary*	Disturbed Area	% Disturbed	
Woodlands, Treelines, Specimen Trees	5.56	2.5	45%
Scenic Views, Ridgelines	0.00	0	0% N/A
Scenic View from existing streets	0.00	0	0% N/A
Total Area	**5.56**	**2.50**	**45%**

*RESOURCES ARE CALCULATED AS OUTSIDE HIGHER CLASS RESOURCES SHOWN ON THE PLANS. RESOURCES DO NOT OVERLAP

SECONDARY CONSERVATION DISTURBED AREA MAX. 50% ALLOWED = COMPLIANT

LEGEND

- OPEN SPACE
- STEEP SLOPES 15-25
- STEEP SLOPES 25+
- ZONE AE FLOODPLAIN
- WETLANDS
- PIPELINE EASEMENT
- SOILS WITH SEASONAL HIGH WATER TABLE
- PROPOSED LIMIT OF DISTURBANCE

FLOODPLAIN NOTE:
A PORTION OF THIS PROPERTY IS LOCATED WITHIN FLOOD HAZARD ZONE AE, A SPECIAL FLOOD HAZARD AREA WITH BASE FLOOD ELEVATIONS PER THE NATIONAL FLOOD INSURANCE RATE MAP FOR CHESTER COUNTY, PA, MAP NO. 42029C0215G, PANEL 215 OF 380, DATED SEPTEMBER 29, 2017. FLOOD PLAIN BOUNDARIES SHOWN HEREON WERE SCALED FROM THE ABOVE MENTIONED MAP.

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POTENTIAL DEVELOPMENT AREA CONCEPT PLAN
SCALE: 1:100_XREF

100 0 50 100 200
GRAPHIC SCALE
1 inch = 100 feet

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POTENTIAL DEVELOPMENT AREA CONCEPT MAP

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	04/14/23
SCALE:	1"=100'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	02 Conservation Design Plan.dwg
PLOTTED:	06/15/23
DRAWING NO.:	CP1.2
SHEET	2 OF 2

PRELIMINARY STORMWATER MANAGEMENT REPORT

for

STOKES ESTATE
85 RESIDENTIAL LOTS

Residential Development
Westtown Township
Chester County, Pennsylvania

March 17, 2023
Revised June 13, 2023

Howell Job# 3868

Prepared for:

Fox Clearing, LLC
227 Granite Run Drive, Suite 100
Lancaster, PA 17601

Prepared by:
HOWELL ENGINEERING
1250 Wrights Lane, West Chester, PA 19380
Phone: 610-918-9002 Fax: 610-918-9003

TABLE OF CONTENTS

LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION

This Stormwater Management Report presents the preliminary permanent control measures/facilities required to support construction activities for the Stokes Estate Residential Development . The 80 +/-acre combined tract is located in Westtown Township (Figure 1-1).

The proposed land development consists of constructing 82 residential dwelling units combined with three (3) existing dwellings (total 85 homes), access roads, stormwater management facilities, and public utilities. Two (2) access points to the parcel will be off Shiloh Road. The buildings and roads will be constructed to comply with design standards and safety requirements of the Townships and local Fire Marshals.

1.1 LAND USE

The existing land is currently utilized for agriculture and residential with pastures for livestock, with a few hedgerows and mature trees scattered throughout, mostly along the existing driveway and near the existing residence and outbuildings. The site generally drains to two separate water bodies, where the southern portion of the property drains to an Unnamed Tributary to the East Branch of Chester Creek that flows through the property, and the eastern end of the site drains directly to the East Branch of Chester Creek, also on the property. Therefore, the entire site is located in the Chester Creek watershed. Per Pennsylvania Department of Environmental Protection, 25 Pa. Code, 93.9g "Water Quality Standards" Chester Creek is classified as Trout Stocking Fishery (TSF).

1.2 SITE SOILS

Site soils mapping provided by the United States Department of Agriculture Natural Resources Conservation Service – Web Soil Survey. According to the Web Soil Survey mapping, the following soil types are located within the project study area;

Baile Silt Loam (Ba)
Codorus Silt Loam (Co)
Gladstone Gravelly Loam (GdB) (GdC) (GfD)
Hatboro Silt Loam (Ha)
Manor Loam (MaD)
Urban land – Gladstone complex, 0 to 8 percent

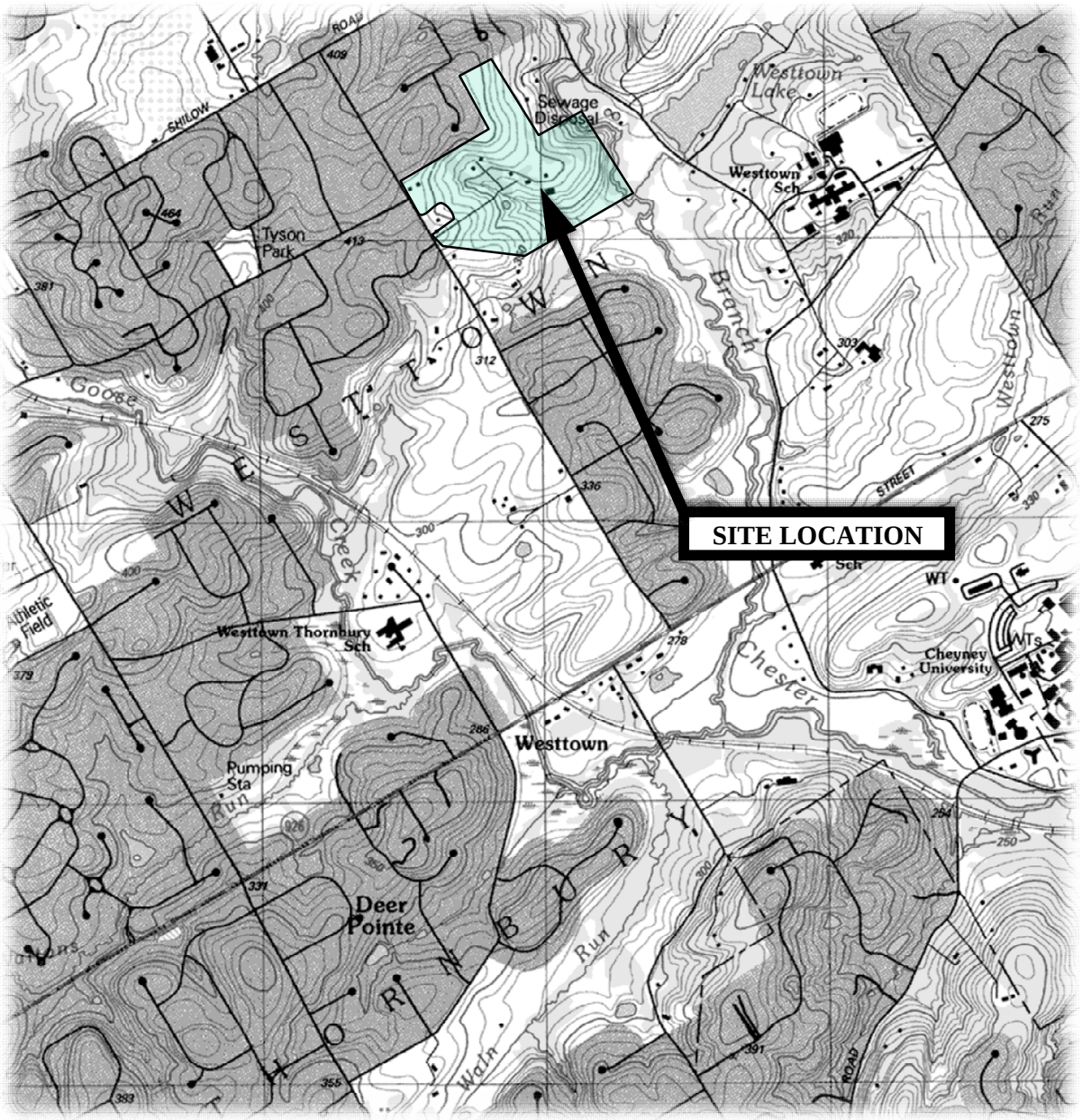
Refer to Appendix E for Soils Map and report.

1.3 SOIL/GEOLOGIC LIMITATIONS:

Some groundwater and rock were encountered in a few locations during infiltration testing. Howell has taken into consideration these known soil limitations when designing the infiltration BMPs for the project. The stormwater infiltration facilities have either been relocated to areas where limiting areas weren't encountered or has been set a minimum of 2 feet higher than any prohibitive soil limitation elevations witnessed during infiltration testing and adequate infiltration results have been achieved at the adjusted elevations.

If during construction, any other unknown soil limitation (i.e. bedrock or high water) is discovered the contractor is responsible for immediately contacting the site geo-technical engineer, design engineer, conservation district and the township engineer for an appropriate solution. The site design drawings contain a pumped water filter bag detail which should be utilized if any excavations need to be dewatered due to high groundwater or excessive rainfall.

Geologic formations/soil conditions that may have the potential to cause pollution:
Furthermore, there are no known geologic formations or soil conditions that have the potential to cause pollution during earth disturbance activities. If during construction, an unknown geologic formations or soil conditions is discovered the contractor is responsible for immediately contacting the Chester County Conservation District and the design engineer.



Source:
United States Department of the Interior Geological Survey
7.5 Minute Series (Topographic) Map
West Chester, Pennsylvania Quadrangle
Scale 1:24000

HOWELL ENGINEERING

Stokes Estate (+)

Westtown Township
Chester County, Pennsylvania

Figure Number:
FIGURE 1-1

Title:
SITE LOCATION MAP

2.0 RUNOFF MANAGEMENT

The purpose of the stormwater management design is to quantify and control stormwater runoff generated by the modifications of the ground surface conditions to the site (i.e. roads, buildings, driveways, etc.). Post-development stormwater management is achieved at the site through five (5) combination surface/subsurface infiltration basins strategically located throughout the site to control runoff.

The infiltration basins with stone beds have been designed utilizing Soil Conservation Service (SCS) method for infiltration and peak flow requirements and Westttown Township regulations for peak flow calculations (See Appendices for worksheets). The stormwater management control for this project was designed to include all impervious surfaces associated with this subdivision application, with an assumption of 3,800 SF of impervious coverage per single family lot. These systems are designed to provide an overall reduction in the post-developed runoff for the 2-year, 10-year, 25-year, 50-year, and 100-year, 24-hour storm event to less than 50% of the pre-development runoff rates for the equivalent storm events based on the Chester Creek Watershed Release Rate Map. A stormwater conveyance system will be utilized to convey runoff from the proposed improvements to the proposed stormwater facilities. The stormwater conveyance system will be designed to convey flows up to the 100-year storm event. Flows to the pipes will be generated using the Universal Rational Method and the pipes sized using Manning's Method and Hydraulic Grade Line calculations will also be provided. The infiltration basins have been designed and sized to fully infiltrate the increase in volume, pre to post-development for the 2-year storm as required by the NPDES Phase II regulations.

3.0 NPDES STORMWATER COMPLIANCE

As stated above, the infiltration facilities have been designed and sized to fully infiltrate the 2-year increase in volume; therefore the NPDES Phase II infiltration requirement has been met. Furthermore, as described above, the infiltration basins have been designed to incorporate Pennsylvania Department of Environmental Protection's infiltration guidelines, as stated in Appendix C of the Pennsylvania Stormwater Best Management Practices Manual dated December 2006. The stormwater management systems have been designed to maximize infiltration best management practice (BMP) technologies and minimize point source discharges. This plan will further act to perform/provide the following:

- Preserve the integrity of stream channels and maintain and protect the physical, biological and chemical qualities of the receiving stream by utilizing several BMPs to handle the increase in runoff and volume prior to reaching the stream.
- Prevent an increase in the rate of stormwater runoff by utilizing BMPs to reduce the peak flow rate of all storm events up to the 100 year to below the equivalent storm in the pre developed condition.
- Minimize any increase in stormwater runoff volume by utilizing infiltration BMPs which are designed and sized to fully infiltrate the 2-year increase in volume.
- Minimize impervious areas
- Maximize the protection of existing drainage features and existing vegetation by capturing stormwater runoff from the proposed impervious areas then conveying the flow to stormwater BMPs facilities prior to any release to the existing stream, thereby protecting it from any sediment.
- Minimize land clearing and grading by protecting and preserving the majority of the existing woodlands, and natural areas.
- Minimize soil compaction by specifying the installation of orange construction fencing to protect the areas of the proposed infiltration BMPs.
- Utilize other structural or nonstructural BMPs that prevent or minimize changes in stormwater runoff. The structural BMPs are infiltration beds, and water quality filters, while the non-

structural BMPs are protecting existing riparian buffers, minimizing total disturbed area, and protecting sensitive features.

Howell Engineering has designed Best management Practices (BMP's) consistent with Chapter 6 of the PA Stormwater Best Management Practices Manual within the stormwater collection and conveyance system in addition to infiltrating the net increase in volume from pre to post-development for the 2-year storm event.

The applicant has been able to demonstrate compliance with 102.8(b), through the use of infiltration.

Permanent BMP's proposed for the developed site are as follows:

- Vegetated Swales
- Infiltration Basins/Beds
- Forebays
- Level Spreaders

4.0 CONCLUSIONS

Howell Engineering has completed a preliminary stormwater engineering design for the proposed project in Westtown Township, Chester County, Pennsylvania. Using site-specific topography, soils, land cover, hydrologic data, and Township Ordinances, Howell Engineering designed the stormwater management system for the proposed facilities. The objective of the stormwater design was to develop site-specific stormwater management structures that reduced post-development runoff to pre-development runoff rates and provided volumetric storage per PADEP NPDES Phase II requirements. Post-development stormwater management is achieved through a stormwater collection system consisting of curbed inlets, swales, catch basins, and stormwater infiltration basins/beds.

APPENDIX A

STORMWATER VOLUME CALCULATIONS

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www.DLHowell.com

CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

Worksheet 4, Pennsylvania Stormwater Best Management Practices Manual — Chapter 8

PROJECT: Stokes Estate
Drainage Area: DP001 Chester Creek
2-Year Rainfall: 3.2 **in**

Total Site Area: _____ **acres**
Protected Site Area: _____ **acres**
Managed Area: 13.67 **acres**

Existing Conditions

Cover Type/Conditions	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Woodland	**A**		0.00	25	30.0000	6.0000	0.29	
Meadow	**A**		0.00	30	23.3333	4.6667	0.10	
Impervious	**A**		0.00	98	0.20	0.04	2.97	
Woodland	**B**	121,182	2.78	55	8.1818	1.6364	0.25	2,534
Meadow	**B**	550,949	12.65	58	7.2414	1.4483	0.34	15,666
Meadow (20% Imperv)	**B**		0.00	58	7.2414	1.4483	0.34	
Impervious (80%)	**B**		0.00	98	0.2041	0.0408	2.97	
Woodland	**C**		0.00	70	4.2857	0.8571	0.83	
Meadow	**C**		0.00	71	4.0845	0.8169	0.88	
Impervious	**C**		0.00	98	0.2041	0.0408	2.97	
Woodland	**D**		0.00	77	2.9870	0.5974	1.21	
Meadow	**D**		0.00	78	2.8205	0.5641	1.27	
Impervious	**D**		0.00	98	0.2041	0.0408	2.97	
TOTAL:		**672,131**	**15.43**					**18,199**

Developed Conditions

Cover Type/Conditions	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Lawn	**B**	415,342	9.53	61	6.3934	1.2787	0.44	15,366
Impervious	**N/A**	153,121	3.52	98	0.2041	0.0408	2.97	37,865
Woods (Existing)	**B**	27,093	0.62	55	8.1818	1.6364	0.25	566
			0.00					
			0.00					
			0.00					
			0.00					
			0.00					
TOTAL:		**595,556**	**13.67**					**53,798**

2-Year Volume Increase (ft^3): 35,599

2-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = Q = (P - 0.2S)2 / (P + 08.S)
   P = 2-Year Rainfall (in)
   S = (1000/CN) - 10

2. Runoff Volume (CF) = Q x Area x 1/12
   Q = Runoff (in)
   Area = Land Use Area (Sq. Ft)

Note: Runoff Volume must be calculated for EACH land use type/condition and HSGI.
The use of a weighted CN value for volume calculations is not acceptable.

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CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

Worksheet 4, Pennsylvania Stormwater Best Management Practices Manual — Chapter 8

PROJECT: Rustin Residential
Drainage Area: DP002 UNT Chester Creek
2-Year Rainfall: 3.2 **in**

Total Site Area: _____ **acres**
Protected Site Area: _____ **acres**
Managed Area: 20.97 **acres**

Existing Conditions

Cover Type/Conditions	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Woodland	**A**		0.00	25	30.0000	6.0000	0.29	
Meadow	**A**		0.00	30	23.3333	4.6667	0.10	
Impervious	**A**		0.00	98	0.20	0.04	2.97	
Woodland	**B**		0.00	55	8.1818	1.6364	0.25	
Meadow	**B**	745,375	17.11	58	7.2414	1.4483	0.34	21,194
Meadow (20% Imperv)	**B**		0.00	58	7.2414	1.4483	0.34	
Impervious (80%)	**B**		0.00	98	0.2041	0.0408	2.97	
Woodland	**C**		0.00	70	4.2857	0.8571	0.83	
Meadow	**C**	91,390	2.10	71	4.0845	0.8169	0.88	6,687
Impervious	**C**		0.00	98	0.2041	0.0408	2.97	
Woodland	**D**		0.00	77	2.9870	0.5974	1.21	
Meadow	**D**		0.00	78	2.8205	0.5641	1.27	
Impervious	**D**		0.00	98	0.2041	0.0408	2.97	
TOTAL:		**836,765**	**19.21**					**27,882**

Developed Conditions

Cover Type/Conditions	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Lawn	**C**	75,360	1.73	74	3.5135	0.7027	1.04	6,516
Lawn	**B**	563,811	12.94	61	6.3934	1.2787	0.44	20,859
Impervious	**N/A**	274,153	6.29	98	0.2041	0.0408	2.97	67,795
			0.00					
			0.00					
			0.00					
			0.00					
			0.00					
			0.00					
TOTAL:		**913,324**	**20.97**					**95,170**

2-Year Volume Increase (ft^3):	**67,289**

2-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = Q = (P - 0.2S)2 / (P + 08.S)
   P = 2-Year Rainfall (in)
   S = (1000/CN) - 10

2. Runoff Volume (CF) = Q x Area x 1/12
   Q = Runoff (in)
   Area = Land Use Area (Sq. Ft)

Note: Runoff Volume must be calculated for EACH land use type/condition and HSGI.
The use of a weighted CN value for volume calculations is not acceptable.

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CHANGE IN RUNOFF VOLUME FOR 2-YR STORM EVENT

Worksheet 4, Pennsylvania Stormwater Best Management Practices Manual — Chapter 8

PROJECT: Stokes Estate
Drainage Area: DP003 UNT Chester Creek
2-Year Rainfall: 3.2 **in**

Total Site Area: _____ **acres**
Protected Site Area: _____ **acres**
Managed Area: 7.87 **acres**

Existing Conditions

Cover Type/Conditions	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Woodland	**A**		0.00	25	30.0000	6.0000	0.29	
Meadow	**A**		0.00	30	23.3333	4.6667	0.10	
Impervious	**A**		0.00	98	0.20	0.04	2.97	
Woodland	**B**		0.00	55	8.1818	1.6364	0.25	
Meadow	**B**	104,108	2.39	58	7.2414	1.4483	0.34	2,960
Meadow (20% Imperv)	**B**		0.00	58	7.2414	1.4483	0.34	
Impervious (80%)	**B**		0.00	98	0.2041	0.0408	2.97	
Woodland	**C**		0.00	70	4.2857	0.8571	0.83	
Meadow	**C**	211,266	4.85	71	4.0845	0.8169	0.88	15,459
Impervious	**C**		0.00	98	0.2041	0.0408	2.97	
Woodland	**D**		0.00	77	2.9870	0.5974	1.21	
Meadow	**D**	41,382	0.95	78	2.8205	0.5641	1.27	4,391
Impervious	**D**		0.00	98	0.2041	0.0408	2.97	
TOTAL:		**356,756**	**8.19**					**22,811**

Developed Conditions

Cover Type/Conditions	Soil Type	Area (sf)	Area (ac)	CN	S	Ia (0.2*S)	Q Runoff[1] (in)	Runoff Volume[2] (ft^3)
Lawn	**B**	49,632	1.14	61	6.3934	1.2787	0.44	1,836
Impervious	**N/A**	98,822	2.27	98	0.2041	0.0408	2.97	24,438
Lawn	**C**	175,962	4.04	78	2.8205	0.5641	1.27	18,672
Lawn	**D**	32,340	0.74	81	2.3457	0.4691	1.47	3,959
			0.00					
			0.00					
			0.00					
			0.00					
TOTAL:		**356,756**	**8.19**					**48,905**

2-Year Volume Increase (ft^3): 26,094

2-Year Volume Increase = Developed Conditions Runoff Volume - Existing Conditions Runoff Volume

1. Runoff (in) = Q = (P - 0.2S)2 / (P + 08.S)
   P = 2-Year Rainfall (in)
   S = (1000/CN) - 10

2. Runoff Volume (CF) = Q x Area x 1/12
   Q = Runoff (in)
   Area = Land Use Area (Sq. Ft)

Note: Runoff Volume must be calculated for EACH land use type/condition and HSGI.
The use of a weighted CN value for volume calculations is not acceptable.

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STRUCTURAL BMP VOLUME CREDITS

Worksheet 5, Pennsylvania Stormwater Best Management Practices Manual — Chapter 8

PROJECT: Stokes Estate
Sub-Basin Chester Creek DP001

Required Control Volume	35,599	**Cubic Feet**
Non-Structural Volume Credit	0	**Cubic Feet**
Structure Volume Requirement	35,599	**Cubic Feet**

Section	Proposed BMP	Area (sf)	Storage Volume (ft^3)
6.4.1	Porous Pavement		
6.4.2	Infiltration Basin		35,889
6.4.3	Infltration Bed		
6.4.4	Infiltration Trench		
6.4.5	Rain Garden/Bioretention		
6.4.6	Dry Well/Seepage Pit		
6.4.7	Constructed Filter		
6.4.8	Vegetated Swale		
6.4.9	Vegetated Filter Strip		
6.4.10	Infiltration Berm		
6.5.1	Vegetated Roof		
6.5.2	Capture and Re-Use		
6.6.1	Constructed Wetlands		
6.6.2	Wet Pond/Retention Basin		
6.6.3	Dry Extended Detention Basin		
6.6.4	Water Quality Filters		
6.7.1	Riparian Buffer Restoration		
6.7.2	Landscape Restoration / Reforestation		
6.7.3	Soil Amendment		
6.8.1	Level Spreader		
6.8.2	Special Storage Areas		
	Other		
		0	**35,889**

Total Structural Volume (cf)	**35,889**
Structural Volume Requirement (cf)	**35,599**
DIFFERENCE	**290**

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STRUCTURAL BMP VOLUME CREDITS

Worksheet 5, Pennsylvania Stormwater Best Management Practices Manual — Chapter 8

PROJECT: Stokes Estate
Sub-Basin UNT Chester Creek DP002

Required Control Volume	67,289	**Cubic Feet**
Non-Structural Volume Credit	0	**Cubic Feet**
Structure Volume Requirement	67,289	**Cubic Feet**

Section	Proposed BMP	Area (sf)	Storage Volume (ft^3)
6.4.2	Infiltration Basin 1 Combined		34,254
6.4.2	Infiltration Basin 2		33,072
6.4.3	Infltration Bed(s)		
6.4.5	Rain Garden/Bioretention		
6.4.6	Dry Well/Seepage Pit		
6.4.7	Constructed Filter		
6.4.8	Vegetated Swale		
6.4.9	Vegetated Filter Strip		
6.4.10	Infiltration Berm		
6.5.1	Vegetated Roof		
6.5.2	Capture and Re-Use		
6.6.1	Constructed Wetlands		
6.6.2	Wet Pond/Retention Basin		
6.6.3	Dry Extended Detention Basin		
6.6.4	Water Quality Filters		
6.7.1	Riparian Buffer Restoration		
6.7.2	Landscape Restoration / Reforestation		
6.7.3	Soil Amendment		
6.8.1	Level Spreader		
6.8.2	Special Storage Areas		
	Other		
		0	**67,326**

Total Structural Volume (cf)	**67,326**
Structural Volume Requirement (cf)	**67,289**
DIFFERENCE	**37**

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STRUCTURAL BMP VOLUME CREDITS

Worksheet 5, Pennsylvania Stormwater Best Management Practices Manual — Chapter 8

PROJECT: Stokes Estate
Sub-Basin UNT Chester Creek DP003

Required Control Volume	26,094	**Cubic Feet**
Non-Structural Volume Credit	0	**Cubic Feet**
Structure Volume Requirement	26,094	**Cubic Feet**

Section	Proposed BMP	Area (sf)	Storage Volume (ft^3)
6.4.2	Basin 4		14,188
6.4.3	UG Bed 1 w/ Basin		12,096
6.4.3	Infiltration Bed(s)		
6.4.5	Rain Garden/Bioretention		
6.4.6	Dry Well/Seepage Pit		
6.4.7	Constructed Filter		
6.4.8	Vegetated Swale		
6.4.9	Vegetated Filter Strip		
6.4.10	Infiltration Berm		
6.5.1	Vegetated Roof		
6.5.2	Capture and Re-Use		
6.6.1	Constructed Wetlands		
6.6.2	Wet Pond/Retention Basin		
6.6.3	Dry Extended Detention Basin		
6.6.4	Water Quality Filters		
6.7.1	Riparian Buffer Restoration		
6.7.2	Landscape Restoration / Reforestation		
6.7.3	Soil Amendment		
6.8.1	Level Spreader		
6.8.2	Special Storage Areas		
	Other		
		0	**26,284**

Total Structural Volume (cf)	**26,284**
Structural Volume Requirement (cf)	**26,094**
DIFFERENCE	**190**

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INFILTRATION VOLUME CALCULATION

Basin 1 Upper

PROJECT NAME: ***Stokes Estate***

LOCATION: ***Westtown Township***

PREPARED BY: ***DWG*** DATE: ***3/30/2021***

CHECKED BY: ***DLH*** DATE:

WATER SURFACE ELEVATION (FEET)	AREA AREA (SQ.FT.)	AVERAGE AREA (SQ.FT.)	DIFFERENCE IN ELEVATION (FEET)	STORAGE VOLUME (CUBIC FEET)	
				INCREMENTAL	TOTAL
320.00	**13,236**				**0**
		14,996	**2.00**	**29991**	
322.00	**16,755**				**29,991**
		18,686	**2.00**	**37372**	
324.00	**20,617**				**67,363**
		22,559	**2.00**	**45117**	
326.00	**24,500**				**112,480**

Proposed Infiltration Volume

Elevation	Storage Volume (CF)
322.00	29,991
322.50	***39,334***
324.00	67,363

Volume = 39,334 CF

*Only 34,254 CF drains to the basin in the 2 year storm, therefore only 34,254 CF is being taken credit for

HOWELL ENGINEERING

INFILTRATION VOLUME CALCULATION

Basin 1 Lower

PROJECT NAME: ***Stokes Estate***

LOCATION: ***Westtown Township***

PREPARED BY: ***DWG*** DATE: ***3/30/2021***

CHECKED BY: ***DLH*** DATE:

WATER SURFACE ELEVATION (FEET)	AREA AREA (SQ.FT.)	AVERAGE AREA (SQ.FT.)	DIFFERENCE IN ELEVATION (FEET)	STORAGE VOLUME (CUBIC FEET)	
				INCREMENTAL	TOTAL
302.00	**2,215**				**0**
		3,094	**2.00**	**6187**	
304.00	**3,972**				**6,187**
		7,254	**2.00**	**14507**	
306.00	**10,535**				**20,694**
		12,703	**2.00**	**25405**	
308.00	**14,870**				**46,099**

Proposed Infiltration Volume

Elevation	Storage Volume (CF)
302.00	0
304.00	***6,187***
304.00	6,187

Volume = 6,187 CF

*the full two year volume to the upper basin is proposed to be infiltrated, the lower basin will infiltrate the volume that drains directly to it.

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INFILTRATION VOLUME CALCULATION
Basin 2

PROJECT NAME: ***Stokes Estate***
LOCATION: ***Westtown Township***
PREPARED BY: ***DWG*** DATE: ***3/30/2021***
CHECKED BY: ***DLH*** DATE:

WATER SURFACE ELEVATION (FEET)	AREA AREA (SQ.FT.)	AVERAGE AREA (SQ.FT.)	DIFFERENCE IN ELEVATION (FEET)	STORAGE VOLUME (CUBIC FEET)	
				INCREMENTAL	TOTAL
306.00	**8,255**				**0**
		10,349	**2.00**	**20698**	
308.00	**12,443**				**20,698**
		14,558	**2.00**	**29116**	
310.00	**16,673**				**49,814**
		18,892	**2.00**	**37783**	
312.00	**21,110**				**87,597**

Proposed Infiltration Volume

Elevation	Storage Volume (CF)
308.00	20,698
308.85	***33,072***
310.00	49,814

Volume = 33,072 CF

HOWELL ENGINEERING

INFILTRATION VOLUME CALCULATION

Basin 3

PROJECT NAME: ***Stokes Estate***

LOCATION: ***Westtown Township***

PREPARED BY: ***DWG*** DATE: ***3/30/2021***

CHECKED BY: ***DLH*** DATE:

WATER SURFACE ELEVATION (FEET)	AREA AREA (SQ.FT.)	AVERAGE AREA (SQ.FT.)	DIFFERENCE IN ELEVATION (FEET)	STORAGE VOLUME (CUBIC FEET)	
				INCREMENTAL	TOTAL
316.00	**15,345**				**0**
		17,505	**2.00**	**35010**	
318.00	**19,665**				**35,010**
		21,938	**2.00**	**43876**	
320.00	**24,211**				**78,886**
		25,391	**1.00**	**25391**	
321.00	**26,570**				**104,277**

Proposed Infiltration Volume

Elevation	Storage Volume (CF)
318.00	35,010
318.50	***45,979***
320.00	78,886

Volume = 45,979 CF

*Only 35,889 CF drains to the basin in the 2 year storm, therefore only 35,889 CF is being taken credit for

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INFILTRATION VOLUME CALCULATION
Basin 4

PROJECT NAME: ***Stokes Estate***
LOCATION: ***Westtown Township***
PREPARED BY: ***DWG*** DATE: ***3/17/2023***
CHECKED BY: ***DLH*** DATE:

WATER SURFACE ELEVATION (FEET)	AREA AREA (SQ.FT.)	AVERAGE AREA (SQ.FT.)	DIFFERENCE IN ELEVATION (FEET)	STORAGE VOLUME (CUBIC FEET)	
				INCREMENTAL	TOTAL
342.00	**Stone**				**0**
			2.00	**0**	
344.00	**4,413**				**1,063**
		5,565	**2.00**	**11130**	
346.00	**6,717**				**12,193**
		7,982	**2.00**	**15963**	
348.00	**9,246**				**28,156**
		10,623	**2.00**	**21246**	
350.00	**12,000**				**49,402**

Proposed Infiltration Volume

Elevation	Storage Volume (CF)
346.00	12,193
346.25	***14,188***
348.00	28,156

Volume = 14,188 CF

HOWELL ENGINEERING

INFILTRATION VOLUME CALCULATION

UG BED 1 w/ Basin

PROJECT NAME: ***Stokes Estate***

LOCATION: ***Westtown Township***

PREPARED BY: ***DWG*** DATE: ***3/17/2023***

CHECKED BY: ***DLH*** DATE:

WATER SURFACE ELEVATION (FEET)	AREA AREA (SQ.FT.)	AVERAGE AREA (SQ.FT.)	DIFFERENCE IN ELEVATION (FEET)	STORAGE VOLUME (CUBIC FEET)	
				INCREMENTAL	TOTAL
336.00	**Stone**				**0**
			3.00	**0**	
339.00	**Stone**				**6,750**
			1.00	**0**	
340.00	**3,380**				**11,253**
		4,215	**2.00**	**8430**	
342.00	**5,050**				**19,683**
		5,998	**2.00**	**11995**	
344.00	**6,945**				**31,678**

Proposed Infiltration Volume

Elevation	Storage Volume (CF)
340.00	11,253
340.20	***12,096***
342.00	19,683

Volume = 12,096 CF

APPENDIX B

TOWNSHIP POST DEVELOPMENT

FLOW REDUCTION SUMMARIES

Stormwater Summary
Peak Flow Reduction Requirements

DATE: 9/30/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: Stormwater Summary DP001 Chester Creek

				% Reduction
1-year	Pre-Developed	1.30 cfs	*Hydrograph 1*	55%
1-year	Post-Developed	0.58 cfs	*Hydrograph 8*	
2-year	Pre-Developed	4.32 cfs	*Hydrograph 1*	73%
2-year	Post-Developed	1.15 cfs	*Hydrograph 8*	
5-year	Pre-Developed	12.58 cfs	*Hydrograph 1*	82%
5-year	Post-Developed	2.31 cfs	*Hydrograph 8*	
10-year	Pre-Developed	20.75 cfs	*Hydrograph 1*	84%
10-year	Post-Developed	3.35 cfs	*Hydrograph 8*	
25-year	Pre-Developed	33.98 cfs	*Hydrograph 1*	77%
25-year	Post-Developed	7.70 cfs	*Hydrograph 8*	
50-year	Pre-Developed	46.28 cfs	*Hydrograph 1*	51%
50-year	Post-Developed	22.70 cfs	*Hydrograph 8*	
100-year	Pre-Developed	60.31 cfs	*Hydrograph 1*	52%
100-year	Post-Developed	29.25 cfs	*Hydrograph 8*	

CHESTER CREEK 0.50 RELEASE RATE AREA

Post Developed 2 Year Flow =	**1.15**	**cfs**	SATISFIED
Pre Developed 1 Year Flow =	**1.30**	**cfs**	
Post Developed 5 Year Flow =	**2.31**	**cfs**	SATISFIED
50% Pre Developed 5 Year Flow =	**6.29**	**cfs**	
Post Developed 10 Year Flow =	**3.35**	**cfs**	SATISFIED
50% Pre Developed 10 Year Flow =	**10.38**	**cfs**	
Post Developed 25 Year Flow =	**7.70**	**cfs**	SATISFIED
50% Pre Developed 25 Year Flow =	**16.99**	**cfs**	
Post Developed 50 Year Flow =	**22.70**	**cfs**	SATISFIED
50% Pre Developed 50Year Flow =	**23.14**	**cfs**	
Post Developed 100 Year Flow =	**29.25**	**cfs**	SATISFIED
50% Pre Developed 100 Year Flow =	**30.16**	**cfs**	

Stormwater Summary
Peak Flow Reduction Requirements

DATE: 9/30/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: Stormwater Summary DP002 UNT Chester Creek

				% Reduction
1-year	Pre-Developed	2.47 cfs	*Hydrograph 2*	83%
1-year	Post-Developed	0.42 cfs	*Hydrograph 16*	
2-year	Pre-Developed	6.85 cfs	*Hydrograph 2*	86%
2-year	Post-Developed	0.96 cfs	*Hydrograph 16*	
5-year	Pre-Developed	18.02 cfs	*Hydrograph 2*	88%
5-year	Post-Developed	2.12 cfs	*Hydrograph 16*	
10-year	Pre-Developed	28.64 cfs	*Hydrograph 2*	89%
10-year	Post-Developed	3.17 cfs	*Hydrograph 16*	
25-year	Pre-Developed	45.70 cfs	*Hydrograph 2*	86%
25-year	Post-Developed	6.17 cfs	*Hydrograph 16*	
50-year	Pre-Developed	46.28 cfs	*Hydrograph 2*	54%
50-year	Post-Developed	21.32 cfs	*Hydrograph 16*	
100-year	Pre-Developed	79.34 cfs	*Hydrograph 2*	52%
100-year	Post-Developed	37.69 cfs	*Hydrograph 16*	

CHESTER CREEK 0.50 RELEASE RATE AREA

Post Developed 2 Year Flow =	**0.96**	**cfs**	SATISFIED
Pre Developed 1 Year Flow =	**2.47**	**cfs**	
Post Developed 5 Year Flow =	**2.12**	**cfs**	SATISFIED
50% Pre Developed 5 Year Flow =	**9.01**	**cfs**	
Post Developed 10 Year Flow =	**3.17**	**cfs**	SATISFIED
50% Pre Developed 10 Year Flow =	**14.32**	**cfs**	
Post Developed 25 Year Flow =	**6.17**	**cfs**	SATISFIED
50% Pre Developed 25 Year Flow =	**22.85**	**cfs**	
Post Developed 50 Year Flow =	**21.32**	**cfs**	SATISFIED
50% Pre Developed 50Year Flow =	**23.14**	**cfs**	
Post Developed 100 Year Flow =	**37.69**	**cfs**	SATISFIED
50% Pre Developed 100 Year Flow =	**39.67**	**cfs**	

Stormwater Summary
Peak Flow Reduction Requirements

DATE: 3/13/2023
BY: DWG
REV: 0

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: Stormwater Summary DP003 UNT Chester Creek

1-year	Pre-Developed	4.79 cfs	*Hydrograph 3*
1-year	Post-Developed	0.97 cfs	*Hydrograph 23*
1-year	Peak Flow (Outside LOD)[1]	0.27 cfs	*Hydrograph 4*
2-year	Pre-Developed	8.02 cfs	*Hydrograph 3*
2-year	Post-Developed	1.59 cfs	*Hydrograph 23*
2-year	Peak Flow (Outside LOD)[1]	0.57 cfs	*Hydrograph 4*
5-year	Pre-Developed	14.55 cfs	*Hydrograph 3*
5-year	Post-Developed	2.82 cfs	*Hydrograph 23*
5-year	Peak Flow (Outside LOD)[1]	1.20 cfs	*Hydrograph 4*
10-year	Pre-Developed	20.20 cfs	*Hydrograph 3*
10-year	Post-Developed	3.88 cfs	*Hydrograph 23*
10-year	Peak Flow (Outside LOD)[1]	1.77 cfs	*Hydrograph 4*
25-year	Pre-Developed	28.88 cfs	*Hydrograph 3*
25-year	Post-Developed	9.90 cfs	*Hydrograph 23*
25-year	Peak Flow (Outside LOD)[1]	2.65 cfs	*Hydrograph 4*
50-year	Pre-Developed	36.78 cfs	*Hydrograph 3*
50-year	Post-Developed	16.09 cfs	*Hydrograph 23*
50-year	Peak Flow (Outside LOD)[1]	3.46 cfs	*Hydrograph 4*
100-year	Pre-Developed	45.54 cfs	*Hydrograph 3*
100-year	Post-Developed	24.22 cfs	*Hydrograph 23*
100-year	Peak Flow (Outside LOD)[1]	4.36 cfs	*Hydrograph 4*

[1]This area is outside the regulated activity (ORA) (or outside the limit of disturbance (LOD)), therefore is not subject to peak flow rate control requirements. As such, the flow from the area outside the LOD is added to the Pre Developed flow that is within the regulated activity to determine the allowable post developed flow.

CHESTER CREEK 0.50 RELEASE RATE AREA

Post Developed 2 Year Flow =	**1.59**	**cfs**	SATISFIED
Pre Developed 1 Year Flow + 2 Year Outside LOD =	**5.36**	**cfs**	
Post Developed 5 Year Flow =	**2.82**	**cfs**	SATISFIED
50% Pre Developed 5 Year Flow + 5 Year Outside LOD =	**8.48**	**cfs**	
Post Developed 10 Year Flow =	**3.88**	**cfs**	SATISFIED
50% Pre Developed 10 Year Flow + 10 Year Outside LOD =	**11.87**	**cfs**	
Post Developed 25 Year Flow =	**9.90**	**cfs**	SATISFIED
50% Pre Developed 25 Year Flow + 25 Year Outside LOD =	**17.09**	**cfs**	
Post Developed 50 Year Flow =	**16.09**	**cfs**	SATISFIED
50% Pre Developed 50 Year Flow + 50 Year Outside LOD =	**21.85**	**cfs**	
Post Developed 100 Year Flow =	**24.22**	**cfs**	SATISFIED
50% Pre Developed 100 Year Flow + 100 Year Outside LOD =	**27.13**	**cfs**	

APPENDIX C

SCS METHOD CURVE NUMBER (CN) CALCULATIONS

HOWELL ENGINEERING

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: PREDEVELOPED AREA CHESTER CREEK DP001

Total Area: 15.43 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	12.65	733.70	
	Loam	B	Woods	Good	55	2.78	152.90	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Woods	Good	70	0.00	0.00	
					Total Area	15.43	886.60	

Weighted Soil Complex Number = 886.6 / 15.4 = 57.5

**SEE HYDRAFLOW REPORT FOR TIME OF CONCENTRATION*

HOWELL ENGINEERING

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: PREDEVELOPED AREA UNT CHESTER CREEK DP002

Total Area: 19.21 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	17.11	992.38	
	Loam	B	Woods	Good	55	0.00	0.00	
Ba	Baile Silt	C	Meadow	Good	71	2.10	149.10	
	Loam	C	Woods	Good	70	0.00	0.00	
					Total Area	19.21	1141.48	

Weighted Soil Complex Number = 1141.5 / 19.2 = 59.4

**SEE HYDRAFLOW REPORT FOR TIME OF CONCENTRATION*

HOWELL ENGINEERING

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: PREDEVELOPED AREA UNT CHESTER CREEK DP003

Total Area: 8.19 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	2.39	138.62	
	Loam	B	Woods	Good	55	0.00	0.00	
Ba	Baile Silt	C	Meadow	Good	71	4.85	344.35	
	Loam	C	Woods	Good	70	0.00	0.00	
Ca	Califon	D	Meadow	Good	80	0.95	76.00	
					Total Area	8.19	558.97	

Weighted Soil Complex Number: 559.0 / 8.2 = 68.3

**SEE HYDRAFLOW REPORT FOR TIME OF CONCENTRATION*

HOWELL ENGINEERING

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: PREDEVELOPED AREA UNT CHESTER CREEK DP003

Total Area: 0.81 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	0.73	42.34	
	Loam	B	Woods	Good	55	0.00	0.00	
		B	Impervious	N/A	98	0.08	7.84	Existing Drive
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Woods	Good	70	0.00	0.00	
					Total Area	0.81	50.18	

Weighted Soil Complex Number = 50.2 / 0.8 = 62.0

ASSUMES 5 MINUTE TIME OF CONCENTRATION

HOWELL ENGINEERING

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: POST DEVELOPED BASIN 3

Total Area: 12.15 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Woods	Good	55	0.62	34.10	
	Loam	B	Lawn	Good	61	8.10	494.23	
		N/A	Impervious	N/A	98	3.43	335.94	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Lawn	Good	74	0.00	0.00	
					Total Area	12.15	864.26	

Weighted Soil Complex Number = 864.3 / 12.2 = 71.1

ASSUMES 5 MINUTE TIME OF CONCENTRATION

HOWELL ENGINEERING

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: POST DEVELOPED BYPASS DP002

Total Area: 1.49 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	0.00	0.00	
	Loam	B	Lawn	Good	61	1.40	85.40	
		N/A	Impervious	N/A	98	0.09	8.55	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Lawn	Good	74	0.00	0.00	
					Total Area	1.49	93.95	

Weighted Soil Complex Number: 93.9 / 1.5 = 63.2

ASSUMES 5 MINUTE TIME OF CONCENTRATION

HOWELL ENGINEERING

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: POST DEVELOPED BASIN 1

Total Area: 10.95 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	0.00	0.00	
	Loam	B	Lawn	Good	61	7.57	461.77	
		N/A	Impervious	N/A	98	3.08	301.86	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Lawn	Good	74	0.30	22.20	
					Total Area	10.95	785.83	

Weighted Soil Complex Number: 785.8 / 11.0 = 71.8

ASSUMES 5 MINUTE TIME OF CONCENTRATION

HOWELL ENGINEERING

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: POST DEVELOPED BASIN 2

Total Area: 8.54 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	0.00	0.00	
	Loam	B	Lawn	Good	61	4.41	269.01	
		N/A	Impervious	N/A	98	3.23	316.23	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Lawn	Good	74	0.90	66.60	
					Total Area	8.54	651.84	

Weighted Soil Complex Number = 651.8 / 8.5 = 76.4

ASSUMES 5 MINUTE TIME OF CONCENTRATION

HOWELL ENGINEERING

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: POST DEVELOPED BYPASS DP002

Total Area: 1.54 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	0.00	0.00	
	Loam	B	Lawn	Good	61	1.54	93.94	
		N/A	Impervious	N/A	98	0.00	0.00	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Lawn	Good	74	0.00	0.00	
					Total Area	1.54	93.94	

Weighted Soil Complex Number: 93.9 / 1.5 = 61.0

ASSUMES 5 MINUTE TIME OF CONCENTRATION

HOWELL ENGINEERING

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/13/2023
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: POST DEVELOPED BASIN 4

Total Area: 4.42 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	0.00	0.00	
	Loam	B	Lawn	Good	61	1.77	107.97	
		N/A	Impervious	N/A	98	1.30	127.47	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Lawn	Good	74	1.35	99.90	
					Total Area	4.42	335.34	

Weighted Soil Complex Number = 335.3 / 4.4 = 75.9

ASSUMES 5 MINUTE TIME OF CONCENTRATION

HOWELL ENGINEERING

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/13/2023
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: POST DEVELOPED UG BED 1

Total Area: 2.82 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	0.00	0.00	
	Loam	B	Lawn	Good	61	0.72	43.92	
		N/A	Impervious	N/A	98	1.08	105.53	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Lawn	Good	74	1.02	75.48	
					Total Area	2.82	224.93	

Weighted Soil Complex Number = 224.9 / 2.8 = 79.9

ASSUMES 5 MINUTE TIME OF CONCENTRATION

HOWELL ENGINEERING

SOIL CONSERVATION SERVICE
HYDROLOGIC DATA FOR WATERSHED
RUNOFF COMPUTATIONS

DATE: 3/29/2021
BY: DWG

JOB NO.: 3868 **PROJECT:** Stokes Estate **TOWNSHIP:** Westtown
DESCRIPTION: POST DEVELOPED BYPASS DP002

Total Area: 1.34 acres

Symbol	Soil Name	Hydrological Soil Group	Land Use	Hydrologic Condition	Soil Runoff Curve Number	Area acres	Complex Number acres	Comment
GdB	Gladstone	B	Meadow	Good	58	0.00	0.00	
	Loam	B	Lawn	Good	61	0.80	48.80	
		N/A	Impervious	N/A	98	0.09	8.55	
Ba	Baile Silt	C	Meadow	Good	71	0.00	0.00	
	Loam	C	Lawn	Good	74	0.45	33.30	
					Total Area	1.34	90.65	

Weighted Soil Complex Number: 90.6 / 1.3 = 67.8

ASSUMES 5 MINUTE TIME OF CONCENTRATION

APPENDIX D

HYDRAFLOW HYDROGRAPH REPORTS

Hydraflow Table of Contents

SWM.gpw

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 13 / 2023

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	1.093	3.942	-------	11.91	19.95	33.01	45.18	59.08	Pre Developed DP001
2	SCS Runoff	------	2.474	6.847	-------	18.02	28.64	45.70	61.46	79.34	Pre Developed DP002
3	SCS Runoff	------	4.785	8.022	-------	14.55	20.20	28.88	36.78	45.54	Pre Developed DP003
4	SCS Runoff	------	0.265	0.566	-------	1.200	1.766	2.654	3.460	4.363	Pre Developed DP003 ORA
5	SCS Runoff	------	11.87	18.03	-------	30.10	40.29	55.64	69.54	84.80	Post Basin 3
6	Reservoir	5	0.000	0.000	-------	0.593	1.664	7.032	20.11	24.42	Basin 3 Routed
7	SCS Runoff	------	0.583	1.146	-------	2.314	3.349	4.966	6.425	8.052	Post Bypass DP001
8	Combine	6, 7	0.583	1.146	-------	2.314	3.349	7.699	22.70	29.25	Post Total DP001
10	SCS Runoff	------	11.30	16.97	-------	28.01	37.29	51.31	63.94	77.75	Post Basin 1
11	Reservoir	10	0.000	0.000	-------	0.510	1.244	3.633	10.69	30.18	Basin 1 Upper Routed
12	Reservoir	11	0.000	0.000	-------	0.375	0.928	2.071	5.226	13.13	Basin 1 Lower Routed
13	SCS Runoff	------	12.13	17.09	-------	26.44	34.26	46.02	56.20	67.22	Post Basin 2
14	Reservoir	13	0.000	0.120	-------	0.682	1.706	5.509	18.98	33.12	Basin 2 Routed
15	SCS Runoff	------	0.417	0.956	-------	2.121	3.170	4.826	6.335	8.028	Post Bypass DP002
16	Combine	12, 14, 15	0.417	0.956	-------	2.121	3.170	6.169	21.32	37.69	Post Total DP002
18	SCS Runoff	------	6.085	8.620	-------	13.42	17.42	23.48	28.74	34.43	Post to Basin 4
19	Reservoir	18	0.000	0.097	-------	0.462	1.213	3.037	4.304	10.36	Basin 4 Routed
20	SCS Runoff	------	4.701	6.430	-------	9.677	12.38	16.34	19.73	23.40	Post to Bed 1/Basin
21	Reservoir	20	0.000	0.073	-------	0.351	1.100	4.714	7.370	10.57	UG Bed 1/Basin Routed
22	SCS Runoff	------	0.972	1.588	-------	2.821	3.883	5.505	6.944	8.571	Post Bypass DP003
23	Combine	19, 21, 22	0.972	1.588	-------	2.821	3.883	9.903	16.09	24.22	Post Total DP003

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

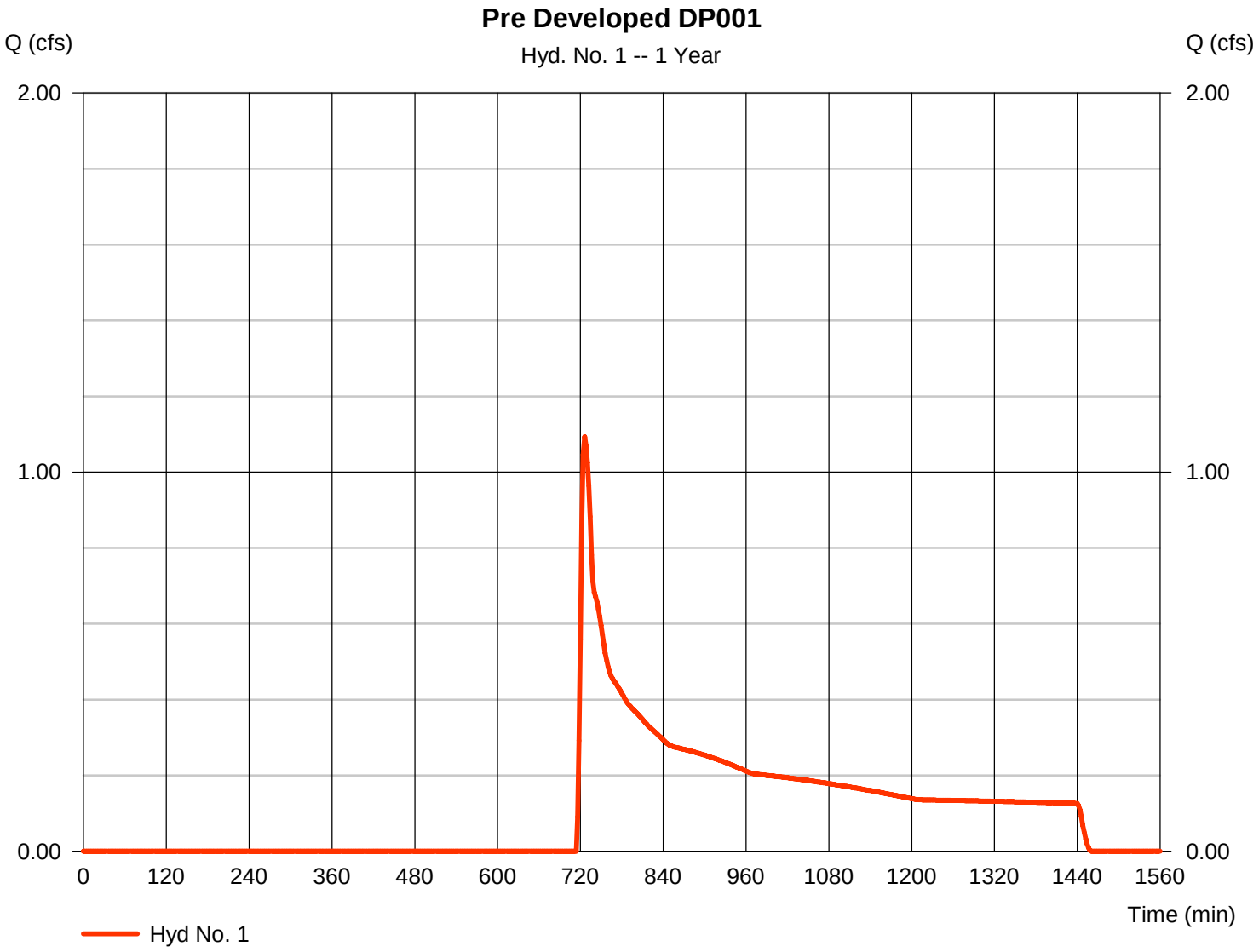
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.093	2	726	9,987	------	------	------	Pre Developed DP001
2	SCS Runoff	2.474	2	724	15,638	------	------	------	Pre Developed DP002
3	SCS Runoff	4.785	2	722	15,004	------	------	------	Pre Developed DP003
4	SCS Runoff	0.265	2	718	787	------	------	------	Pre Developed DP003 ORA
5	SCS Runoff	11.87	2	718	24,737	------	------	------	Post Basin 3
6	Reservoir	0.000	2	n/a	0	5	317.29	24,737	Basin 3 Routed
7	SCS Runoff	0.583	2	718	1,570	------	------	------	Post Bypass DP001
8	Combine	0.583	2	718	1,570	6, 7	------	------	Post Total DP001
10	SCS Runoff	11.30	2	718	23,379	------	------	------	Post Basin 1
11	Reservoir	0.000	2	n/a	0	10	321.56	23,379	Basin 1 Upper Routed
12	Reservoir	0.000	2	n/a	0	11	302.20	0.000	Basin 1 Lower Routed
13	SCS Runoff	12.13	2	718	24,366	------	------	------	Post Basin 2
14	Reservoir	0.000	2	n/a	0	13	308.25	24,366	Basin 2 Routed
15	SCS Runoff	0.417	2	720	1,355	------	------	------	Post Bypass DP002
16	Combine	0.417	2	720	1,355	12, 14, 15	------	------	Post Total DP002
18	SCS Runoff	6.085	2	718	12,240	------	------	------	Post to Basin 4
19	Reservoir	0.000	2	n/a	0	18	346.01	12,240	Basin 4 Routed
20	SCS Runoff	4.701	2	718	9,401	------	------	------	Post to Bed 1/Basin
21	Reservoir	0.000	2	n/a	0	20	339.59	9,401	UG Bed 1/Basin Routed
22	SCS Runoff	0.972	2	718	2,149	------	------	------	Post Bypass DP003
23	Combine	0.972	2	718	2,149	19, 21, 22	------	------	Post Total DP003

Hydrograph Report

Hyd. No. 1

Pre Developed DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.093 cfs
Storm frequency	=	1 yrs	Time to peak	=	726 min
Time interval	=	2 min	Hyd. volume	=	9,987 cuft
Drainage area	=	15.430 ac	Curve number	=	57.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 1

Pre Developed DP001

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.20		0.00		0.00		
Land slope (%)	= 4.00		0.00		0.00		
Travel Time (min)	**= 10.81**	**+**	**0.00**	**+**	**0.00**	**=**	**10.81**
Shallow Concentrated Flow							
Flow length (ft)	= 330.00		0.00		0.00		
Watercourse slope (%)	= 9.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=4.84		0.00		0.00		
Travel Time (min)	**= 1.14**	**+**	**0.00**	**+**	**0.00**	**=**	**1.14**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

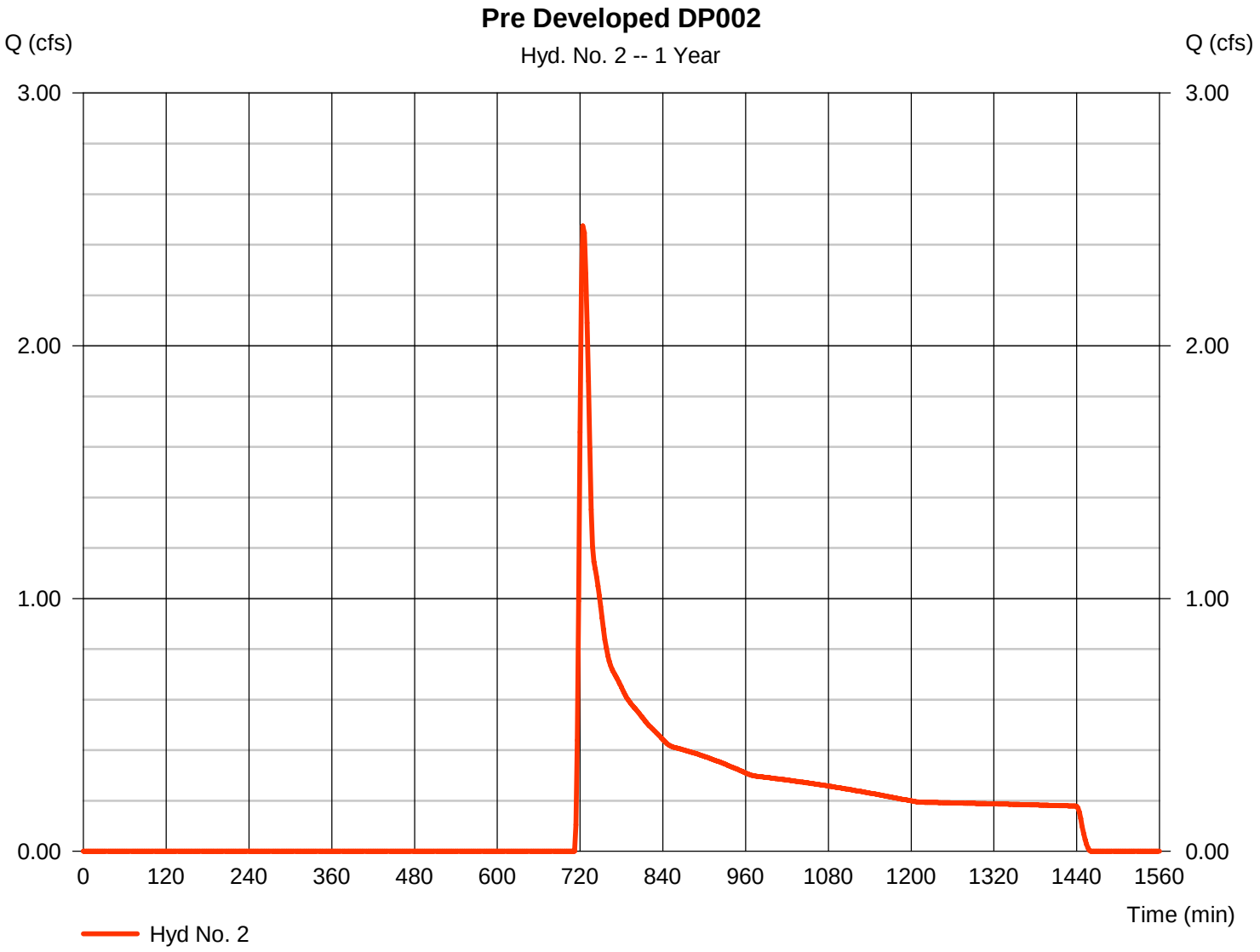
Total Travel Time, Tc ..... 12.00 min

Hydrograph Report

Hyd. No. 2

Pre Developed DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.474 cfs
Storm frequency	=	1 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	15,638 cuft
Drainage area	=	19.210 ac	Curve number	=	59.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

Hyd. No. 2

Pre Developed DP002

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.20		0.00		0.00		
Land slope (%)	= 7.00		0.00		0.00		
Travel Time (min)	**= 8.65**	**+**	**0.00**	**+**	**0.00**	**=**	**8.65**
Shallow Concentrated Flow							
Flow length (ft)	= 957.00		0.00		0.00		
Watercourse slope (%)	= 8.90		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=4.81		0.00		0.00		
Travel Time (min)	**= 3.31**	**+**	**0.00**	**+**	**0.00**	**=**	**3.31**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

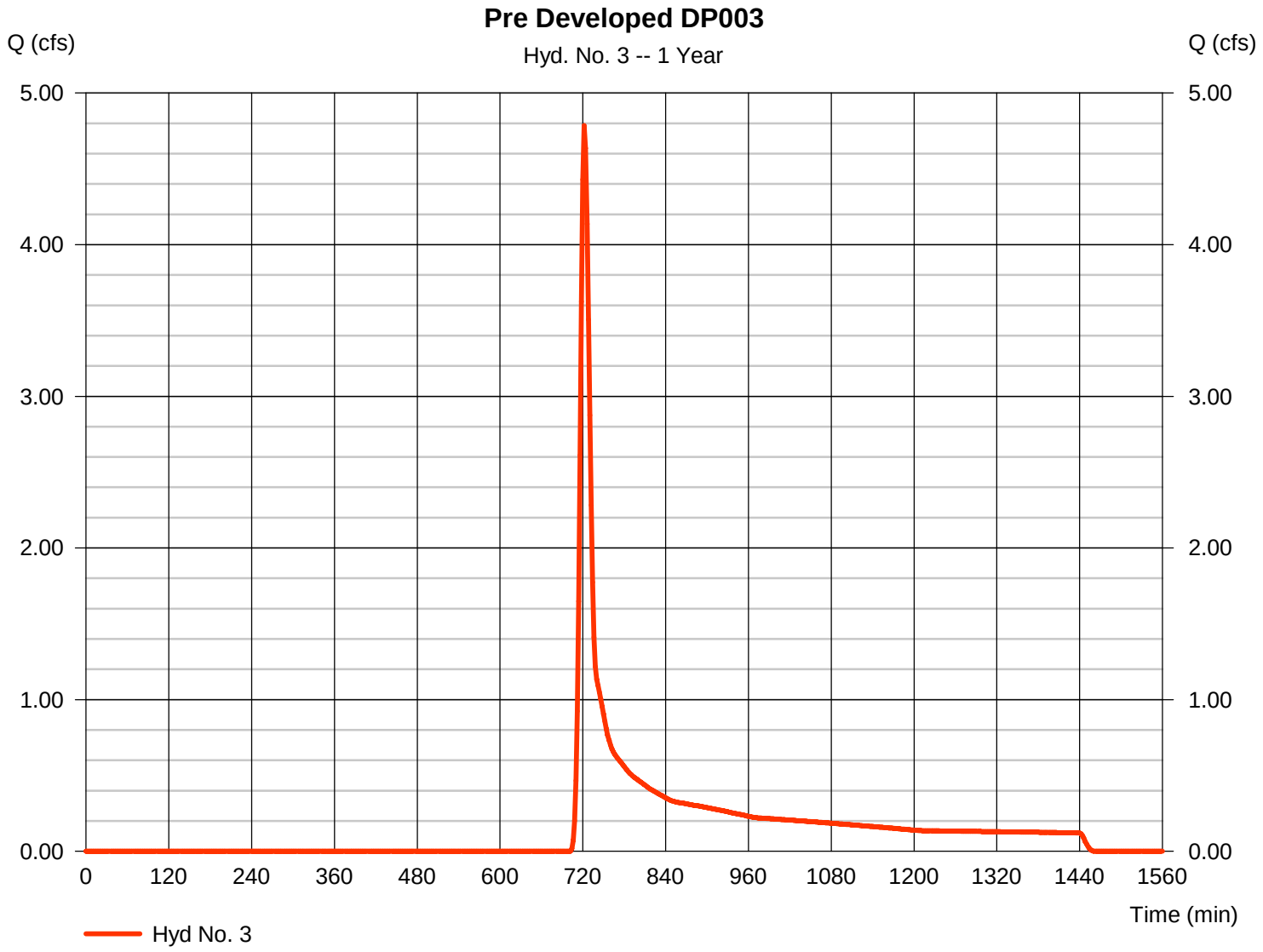
Total Travel Time, Tc ..... 12.00 min

Hydrograph Report

Hyd. No. 3

Pre Developed DP003

Hydrograph type	= SCS Runoff	Peak discharge	= 4.785 cfs
Storm frequency	= 1 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 15,004 cuft
Drainage area	= 8.190 ac	Curve number	= 68.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.00 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hyd. No. 3

Pre Developed DP003

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.20		0.00		0.00		
Land slope (%)	= 10.00		0.00		0.00		
Travel Time (min)	**= 7.50**	**+**	**0.00**	**+**	**0.00**	**=**	**7.50**
Shallow Concentrated Flow							
Flow length (ft)	= 566.00		0.00		0.00		
Watercourse slope (%)	= 8.80		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=4.79		0.00		0.00		
Travel Time (min)	**= 1.97**	**+**	**0.00**	**+**	**0.00**	**=**	**1.97**
Channel Flow							
X sectional flow area (sqft)	= 1.50		0.00		0.00		
Wetted perimeter (ft)	= 3.00		0.00		0.00		
Channel slope (%)	= 3.40		0.00		0.00		
Manning's n-value	= 0.035		0.015		0.015		
Velocity (ft/s)	=4.93						
			0.00				
					0.00		
Flow length (ft)	({0})440.0		0.0		0.0		
Travel Time (min)	**= 1.49**	**+**	**0.00**	**+**	**0.00**	**=**	**1.49**

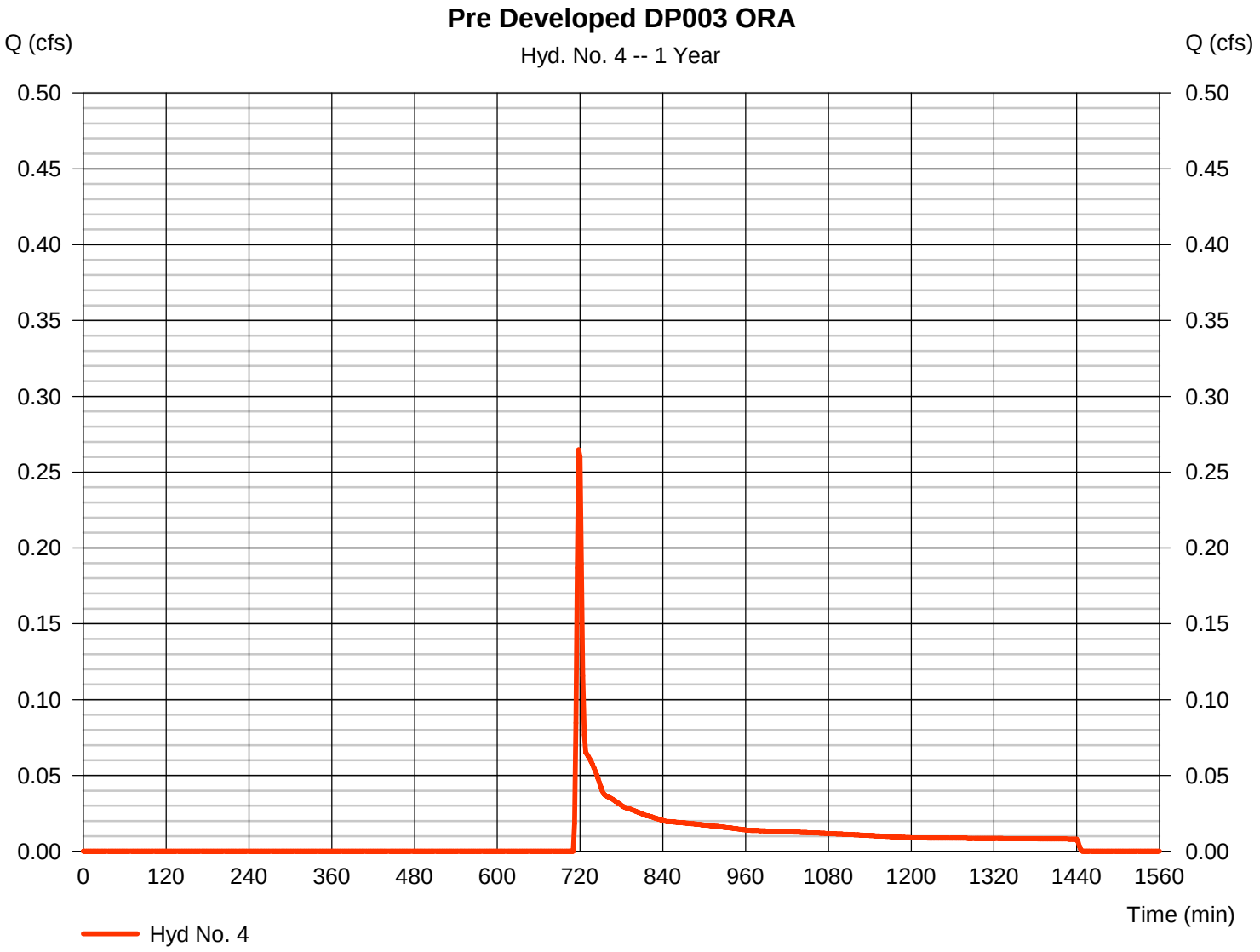
Total Travel Time, Tc ..... 11.00 min

Hydrograph Report

Hyd. No. 4

Pre Developed DP003 ORA

Hydrograph type	= SCS Runoff	Peak discharge	= 0.265 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 787 cuft
Drainage area	= 0.810 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.70 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

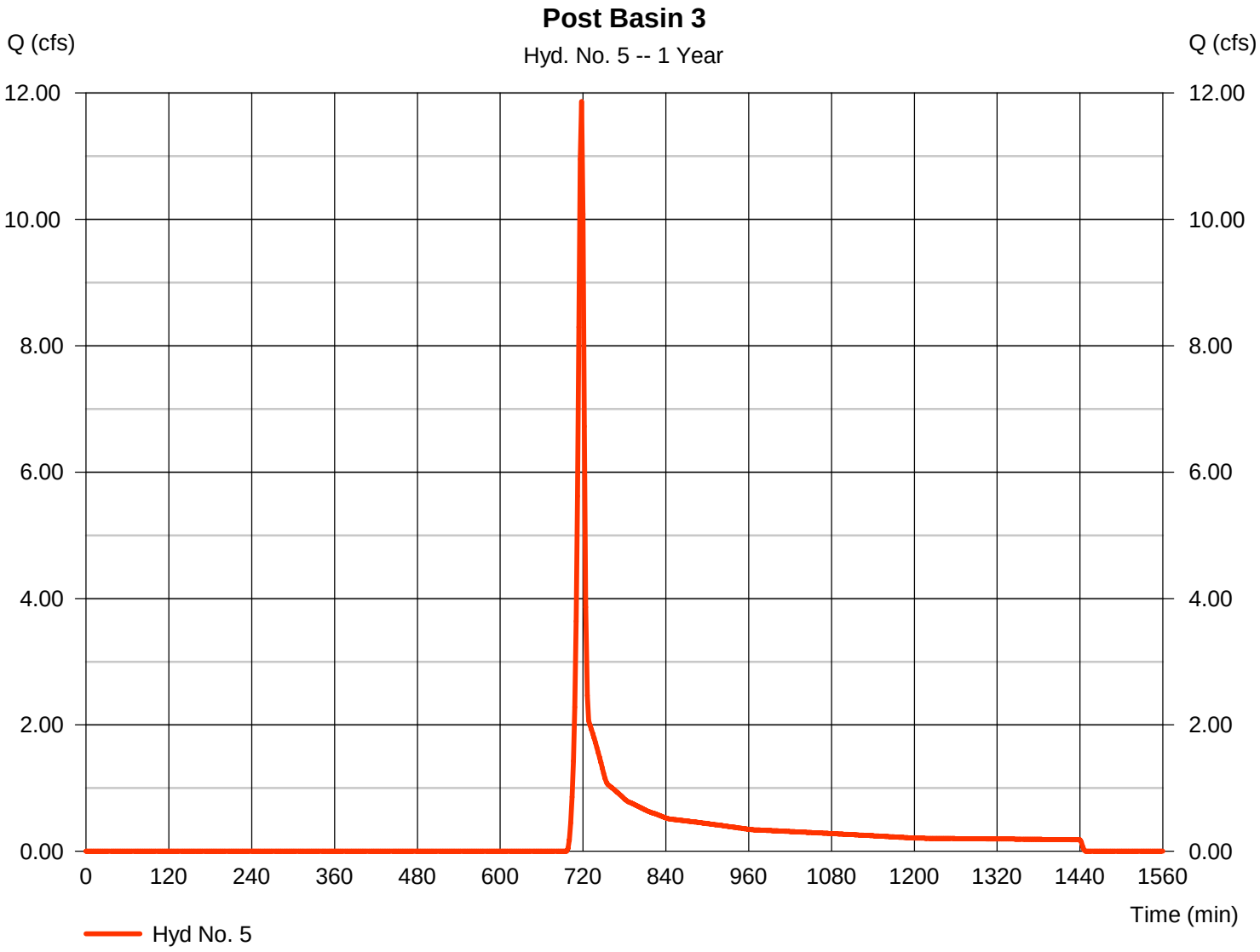


Hydrograph Report

Hyd. No. 5

Post Basin 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.87 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	24,737 cuft
Drainage area	=	12.150 ac	Curve number	=	71.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



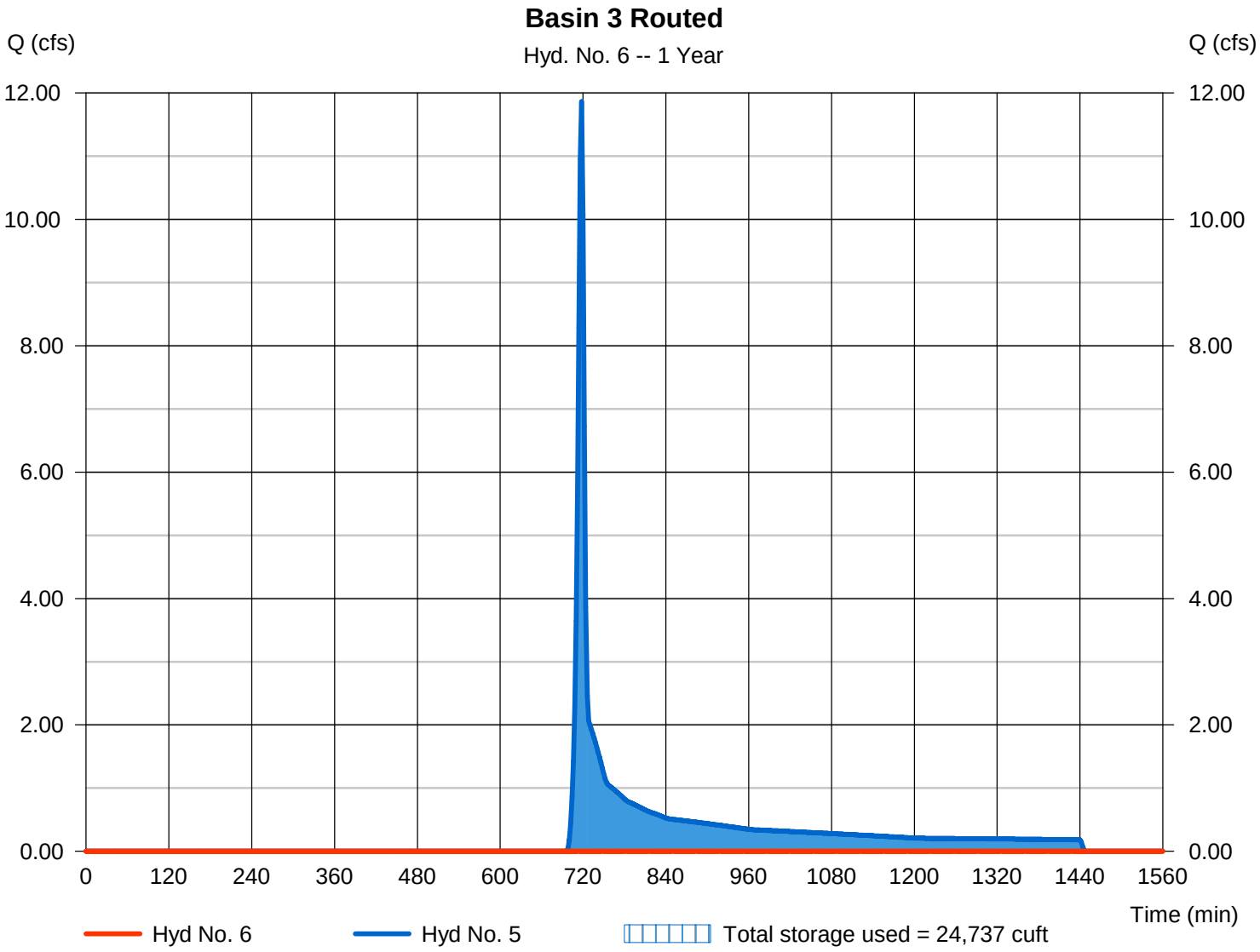
Hydrograph Report

Hyd. No. 6

Basin 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	5 - Post Basin 3	Max. Elevation	=	317.29 ft
Reservoir name	=	Basin 3	Max. Storage	=	24,737 cuft

Storage Indication method used.



Pond Report

Pond No. 5 - Basin 3

Pond Data

Contours -User-defined contour areas. Average end area method. Begin at bottom elevation = 314.00 ft, Depth increment = 0.100 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	314.00	2,600	0	0
0.20	314.20	2,600	207	207
0.40	314.40	2,600	207	414
0.60	314.60	2,600	207	621
0.80	314.80	2,600	207	828
1.00	314.99	2,600	207	1,035
1.19	315.19	2,600	207	1,242
1.39	315.39	2,600	207	1,449
1.59	315.59	2,600	207	1,656
1.79	315.79	2,600	207	1,863
1.99	315.99	2,600	207	2,070
2.00	316.00	15,345	90	2,159
4.00	318.00	19,665	35,010	37,169
6.00	320.00	24,211	43,876	81,045
7.00	321.00	26,570	25,391	106,436

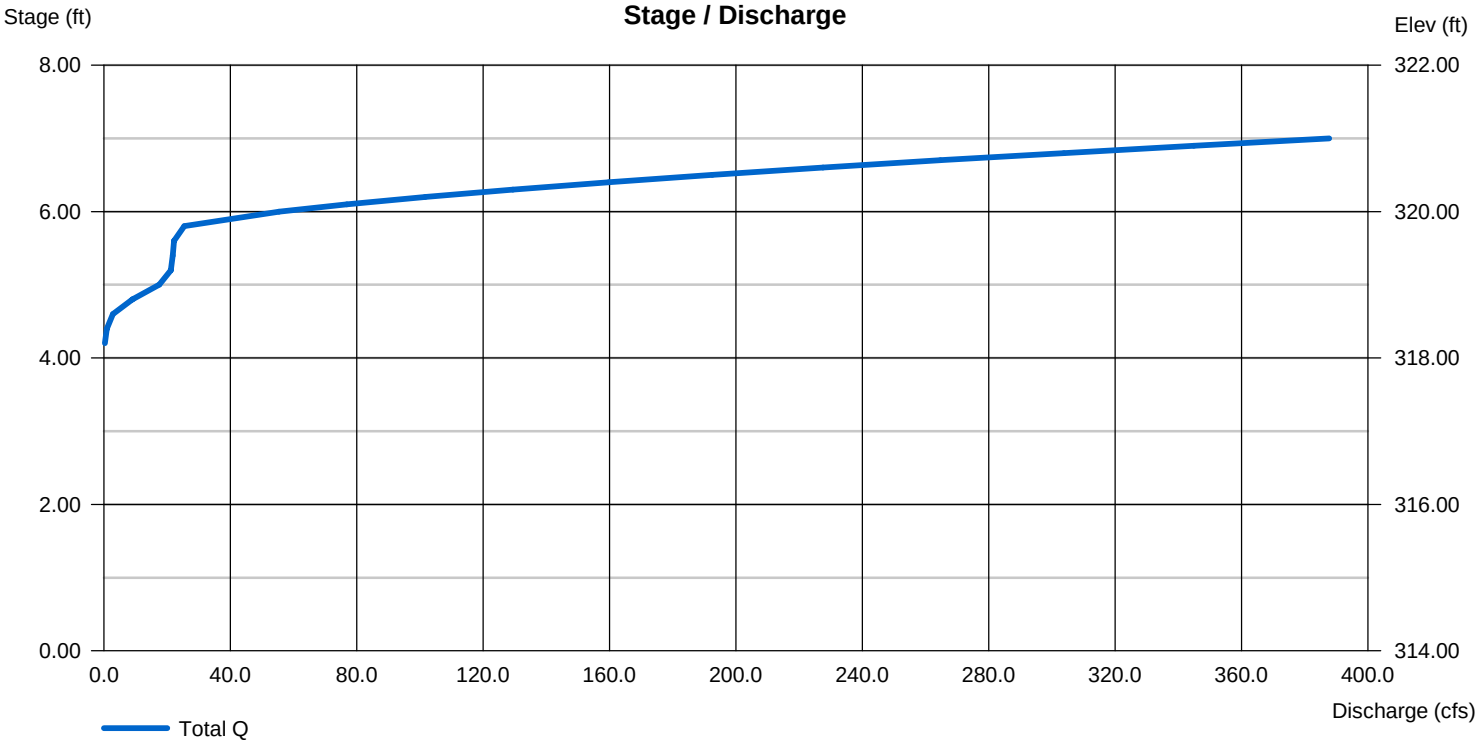
Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 312.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 5.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	1.00	100.00	0.00
Crest El. (ft)	= 318.50	318.00	319.75	0.00
Weir Coeff.	= 3.33	3.33	2.60	3.33
Weir Type	= 1	Rect	Broad	---
Multi-Stage	= Yes	Yes	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

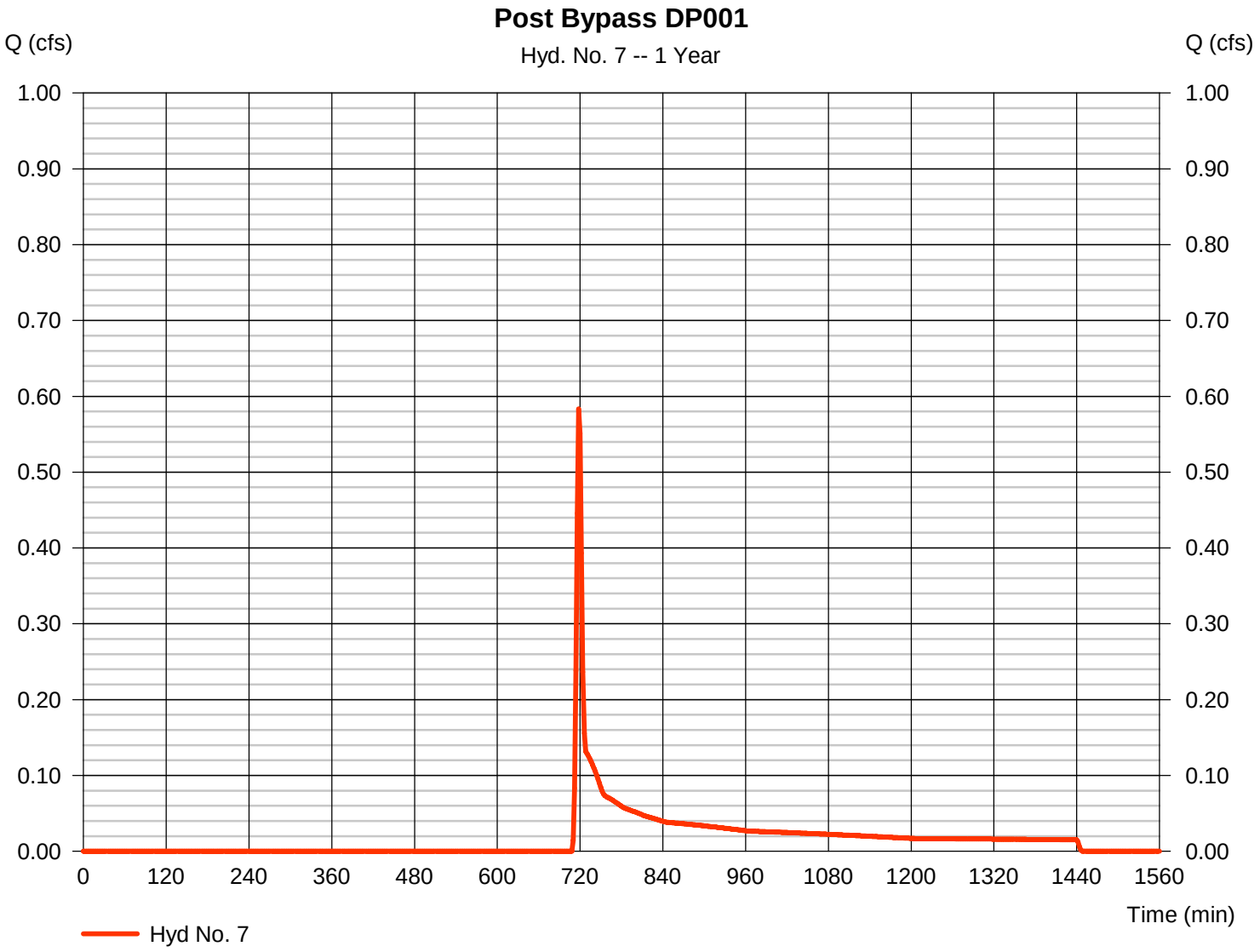


Hydrograph Report

Hyd. No. 7

Post Bypass DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.583 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	1,570 cuft
Drainage area	=	1.440 ac	Curve number	=	63.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

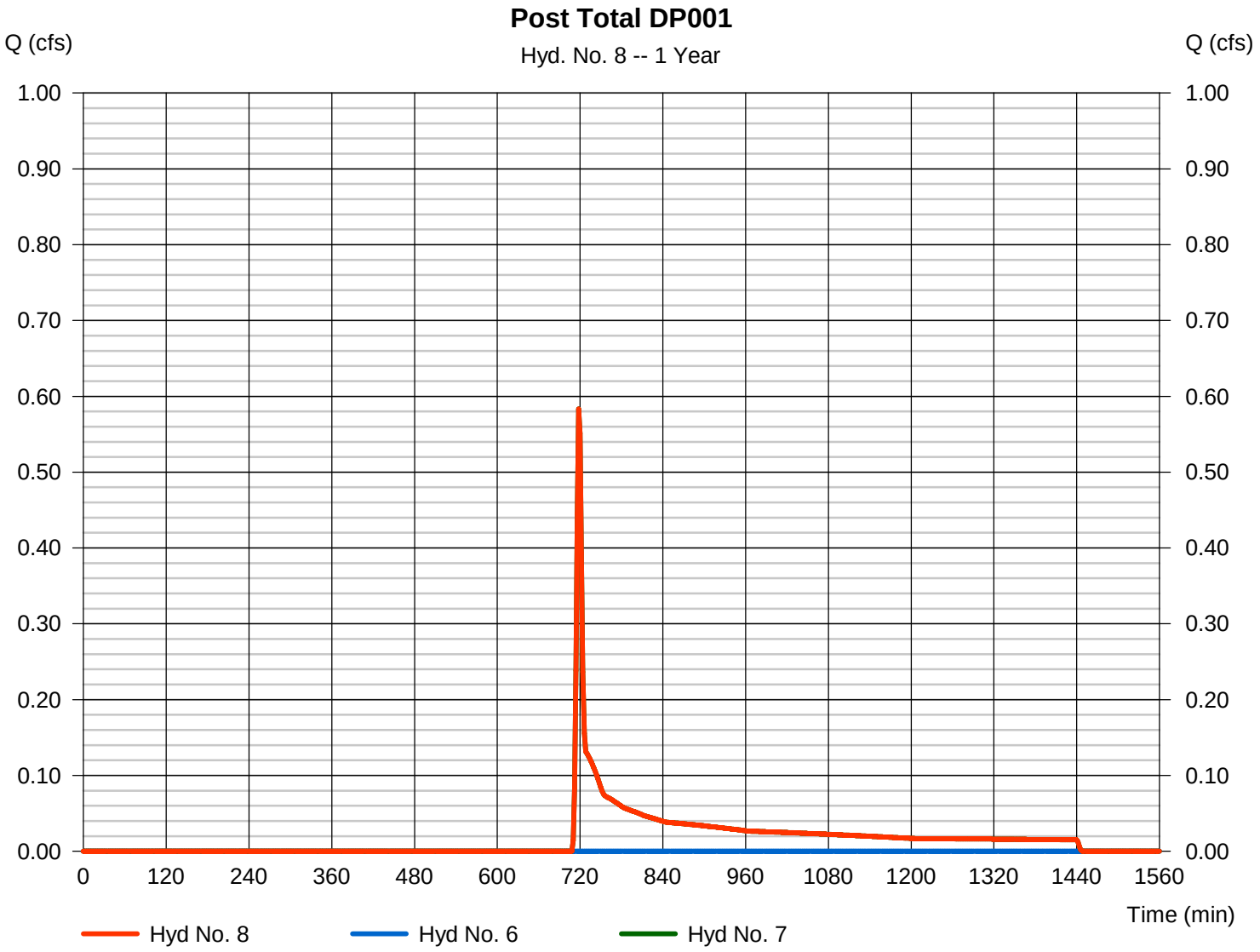


Hydrograph Report

Hyd. No. 8

Post Total DP001

Hydrograph type	= Combine	Peak discharge	= 0.583 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 1,570 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.440 ac

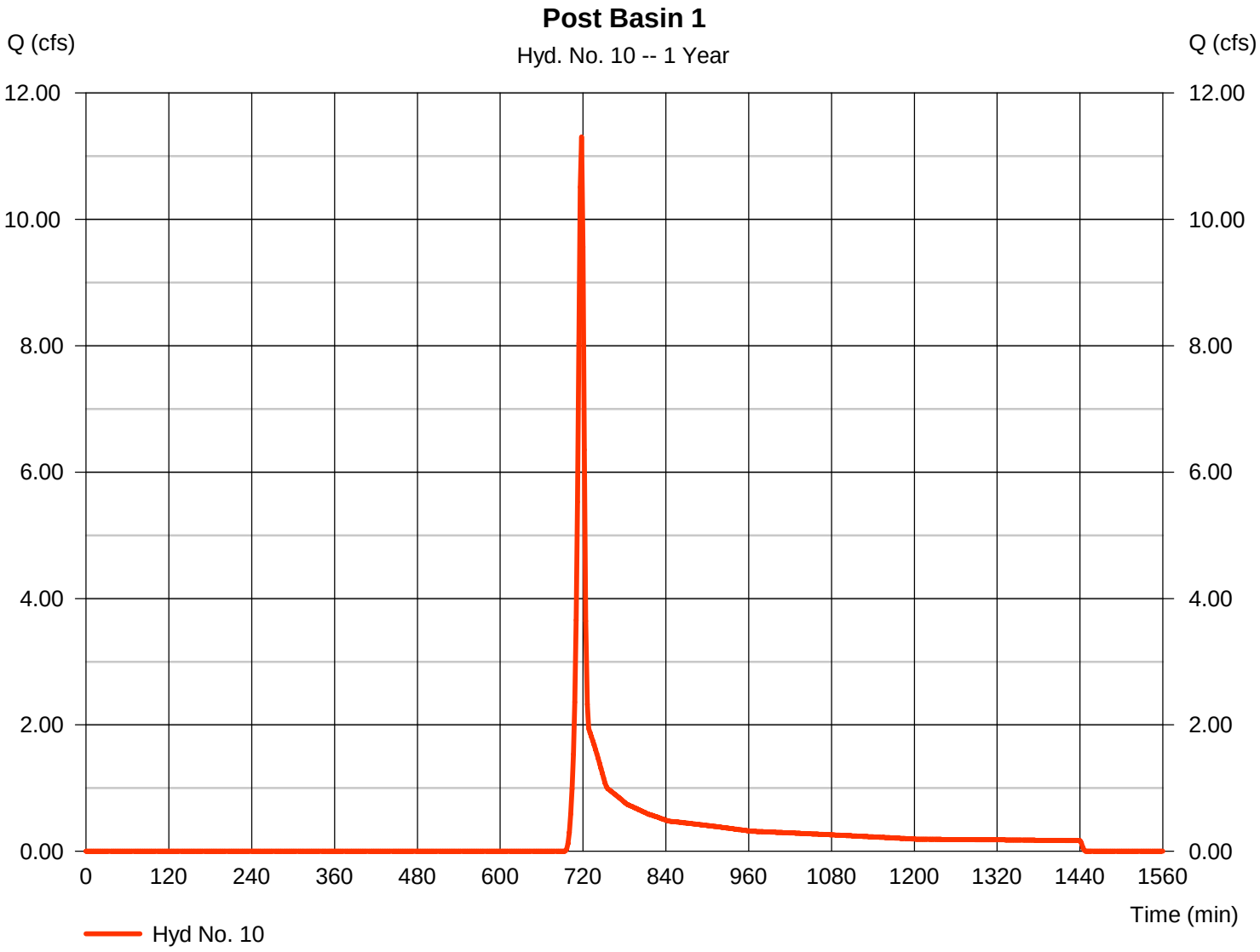


Hydrograph Report

Hyd. No. 10

Post Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.30 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	23,379 cuft
Drainage area	=	10.950 ac	Curve number	=	71.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



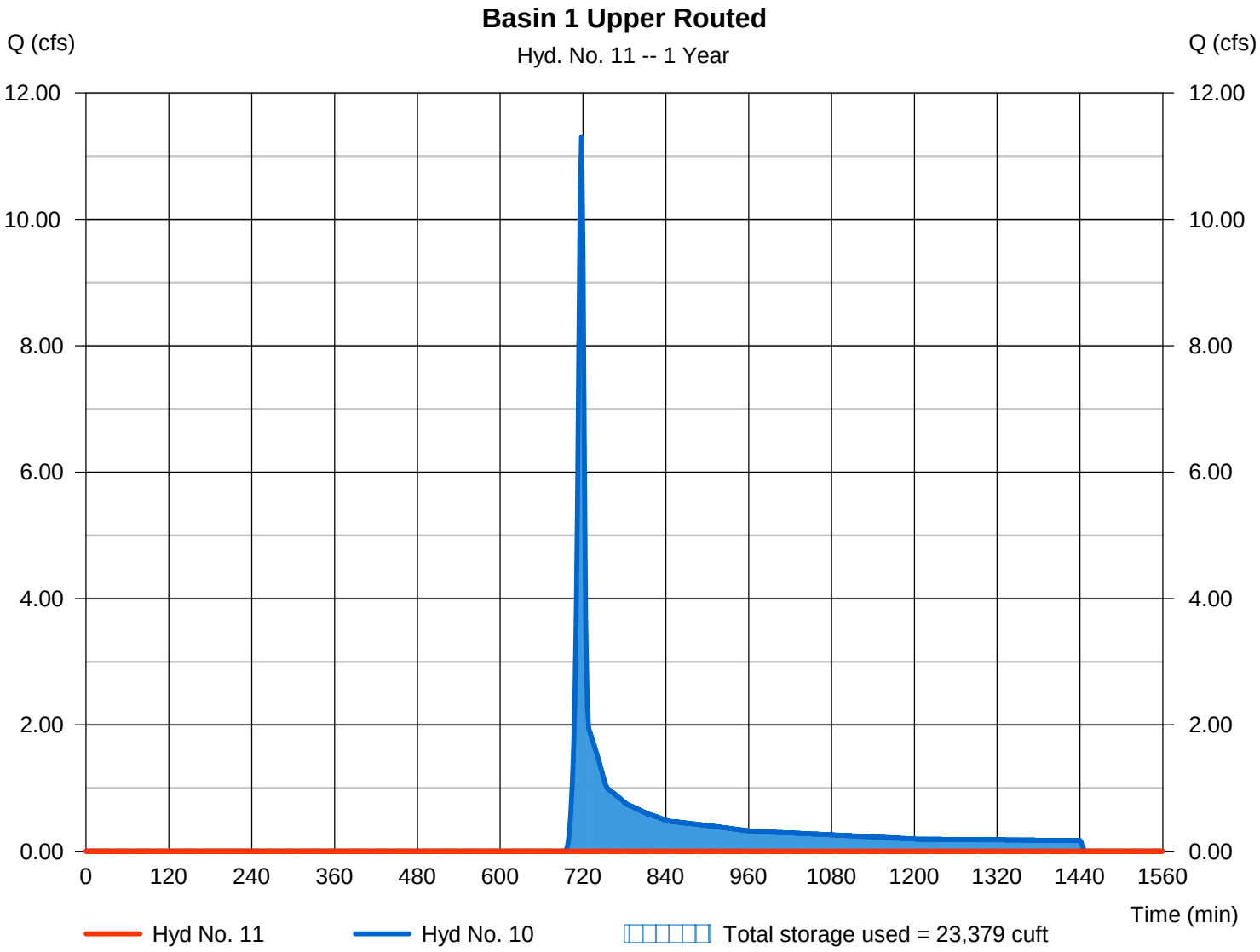
Hydrograph Report

Hyd. No. 11

Basin 1 Upper Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	10 - Post Basin 1	Max. Elevation	=	321.56 ft
Reservoir name	=	Basin 1 Upper	Max. Storage	=	23,379 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - Basin 1 Upper

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 320.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	320.00	13,236	0	0
2.00	322.00	16,755	29,991	29,991
4.00	324.00	20,617	37,372	67,363
6.00	326.00	24,500	45,117	112,480

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 314.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

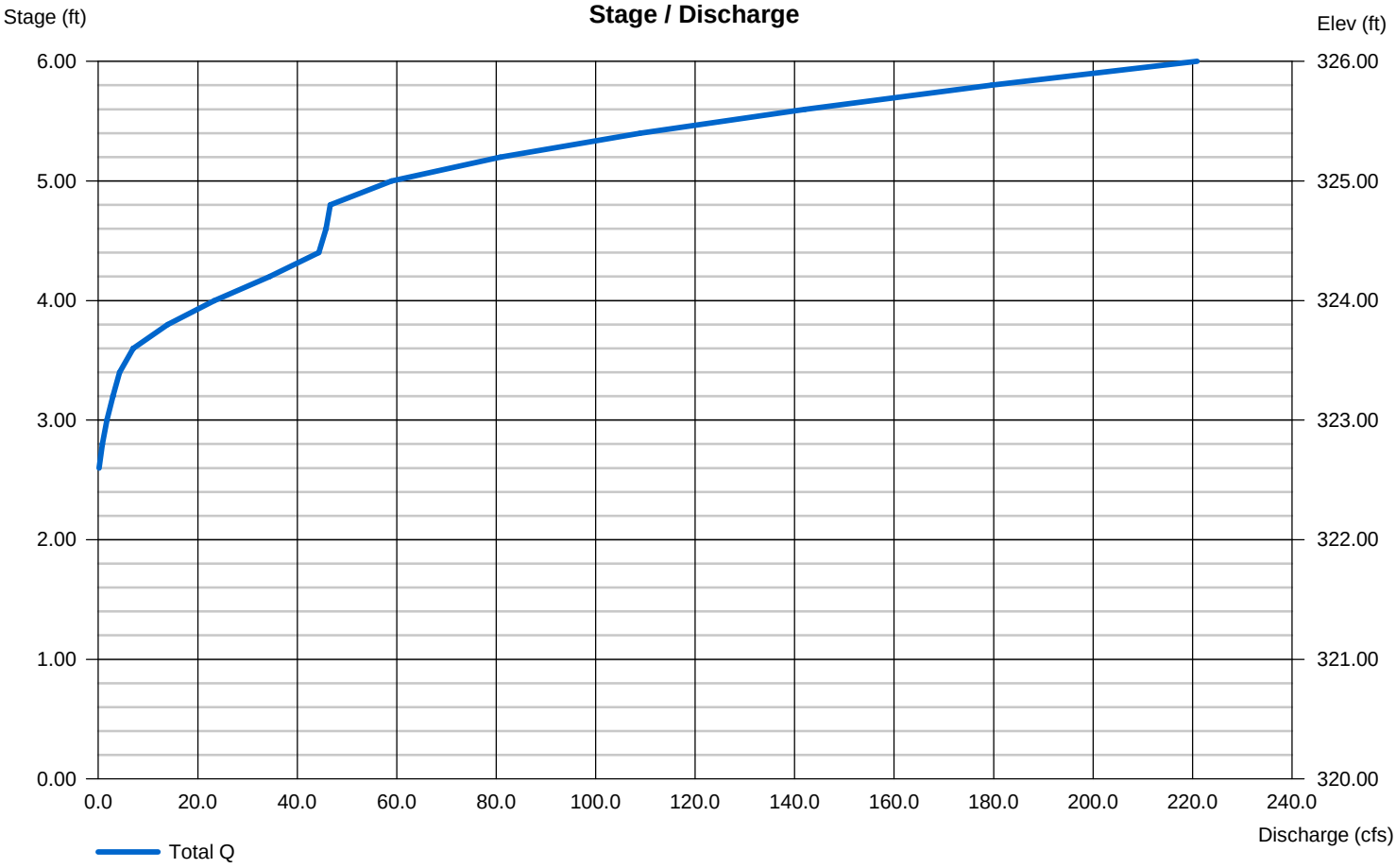
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	1.50	50.00	0.00
Crest El. (ft)	= 323.50	322.50	324.80	0.00
Weir Coeff.	= 3.33	3.33	2.60	3.33
Weir Type	= 1	Rect	Broad	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



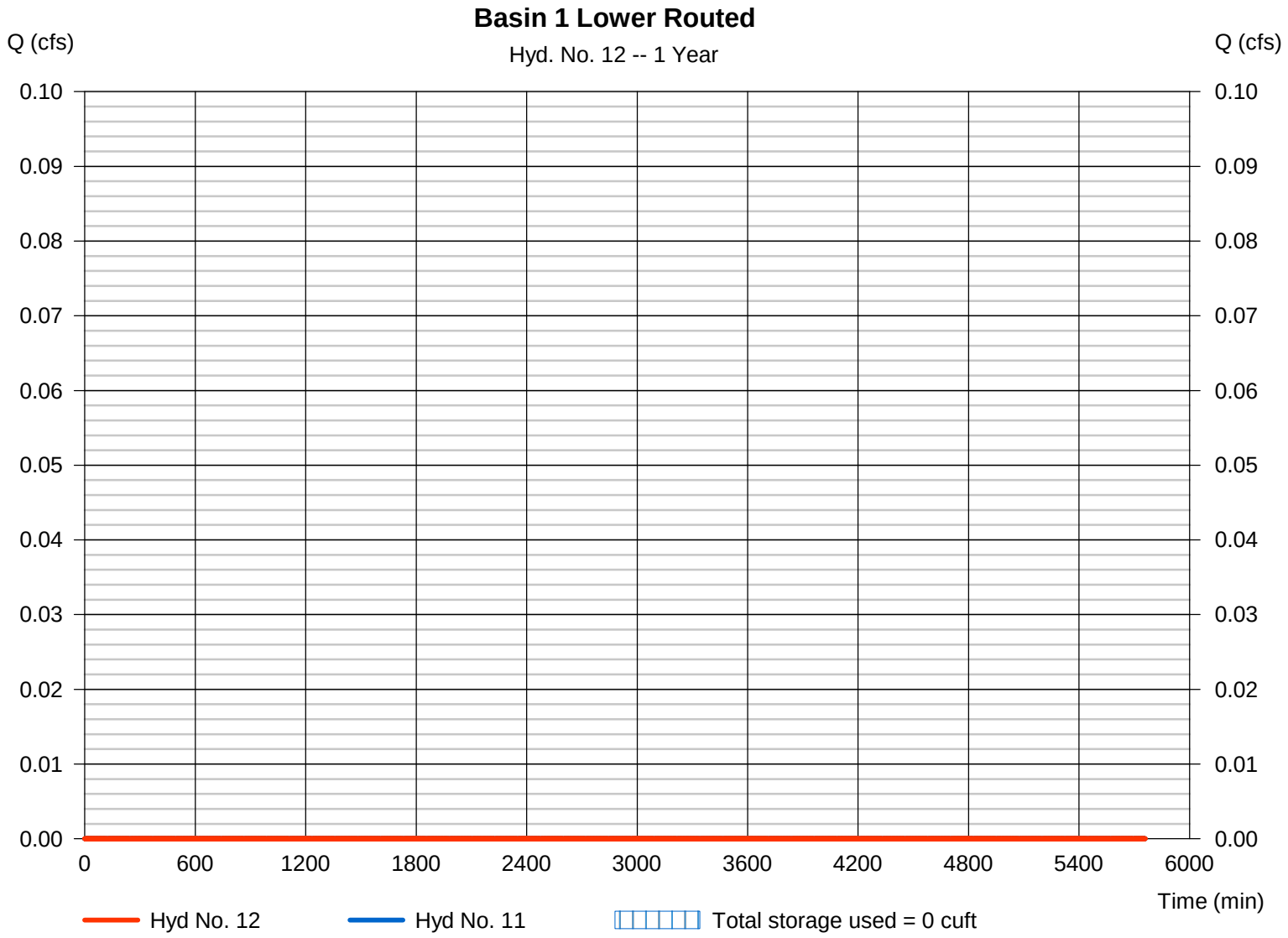
Hydrograph Report

Hyd. No. 12

Basin 1 Lower Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	11 - Basin 1 Upper Routed	Max. Elevation	=	302.20 ft
Reservoir name	=	Basin 1 Lower	Max. Storage	=	0 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Basin 1 Lower

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 302.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	302.00	2,215	0	0
2.00	304.00	3,972	6,187	6,187
4.00	306.00	10,535	14,507	20,694
6.00	308.00	14,870	25,405	46,099

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	9.00	0.00	0.00
Span (in)	= 18.00	9.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 302.00	304.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

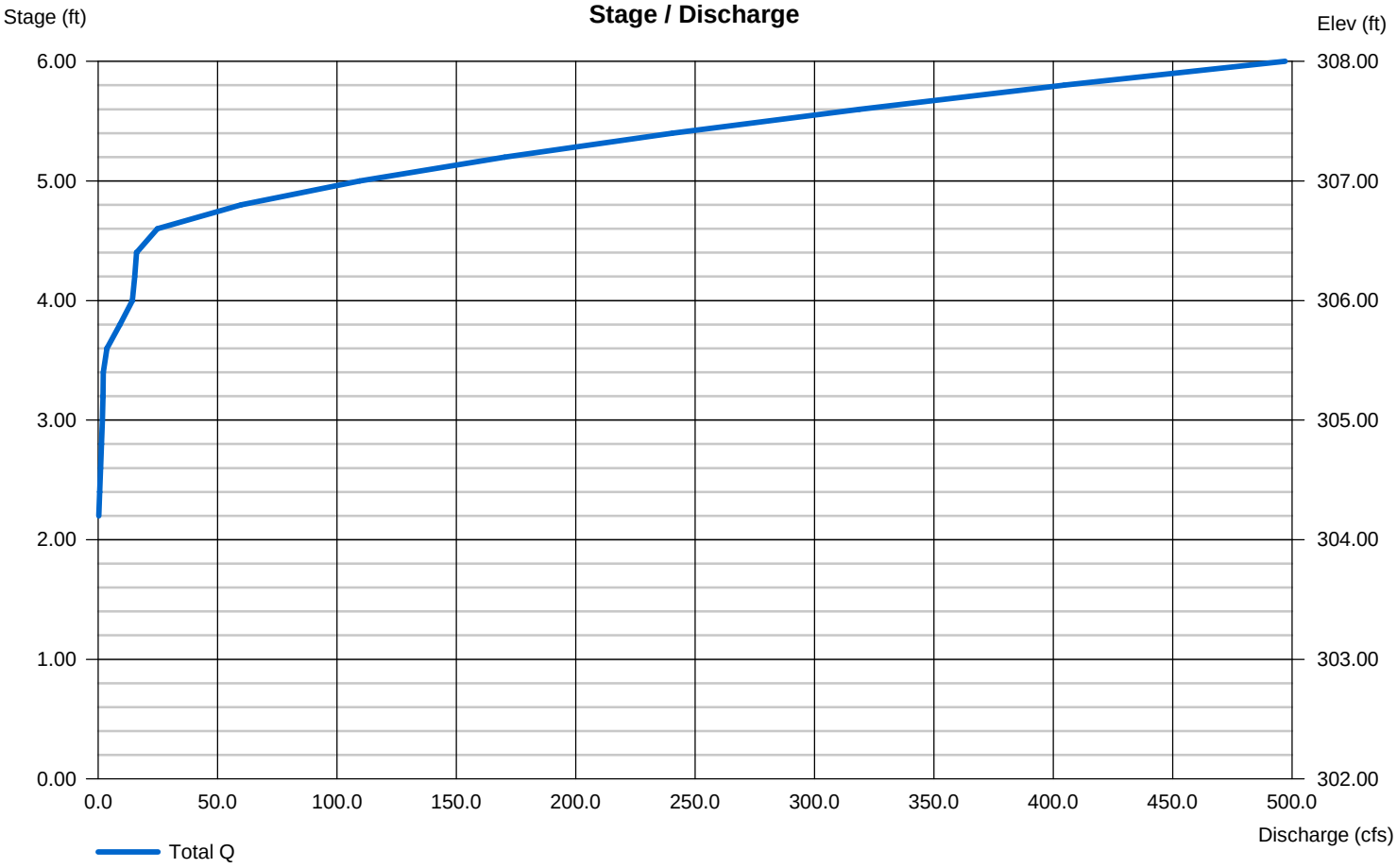
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	100.00	0.00	0.00
Crest El. (ft)	= 305.50	306.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

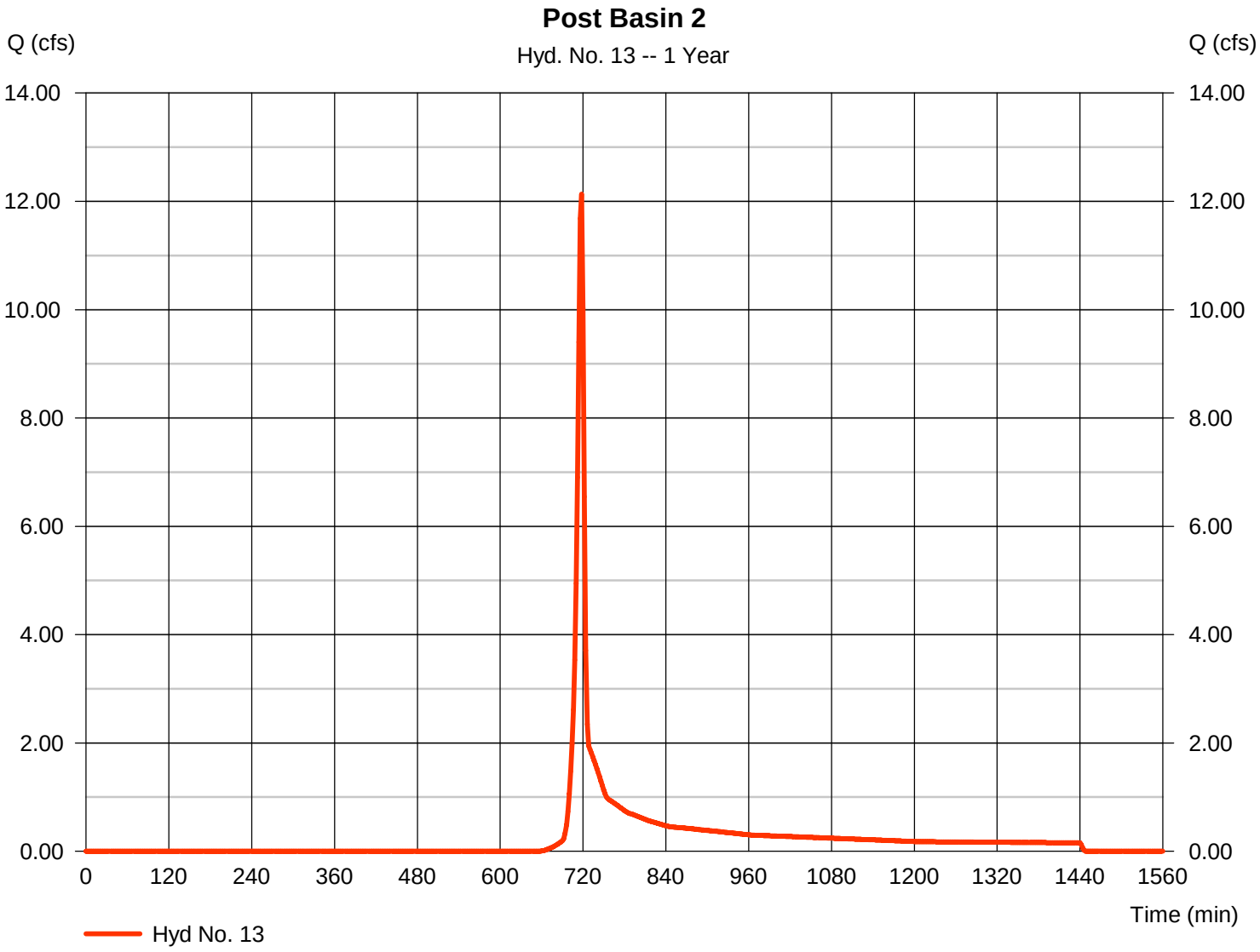


Hydrograph Report

Hyd. No. 13

Post Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.13 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	24,366 cuft
Drainage area	=	8.540 ac	Curve number	=	76.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



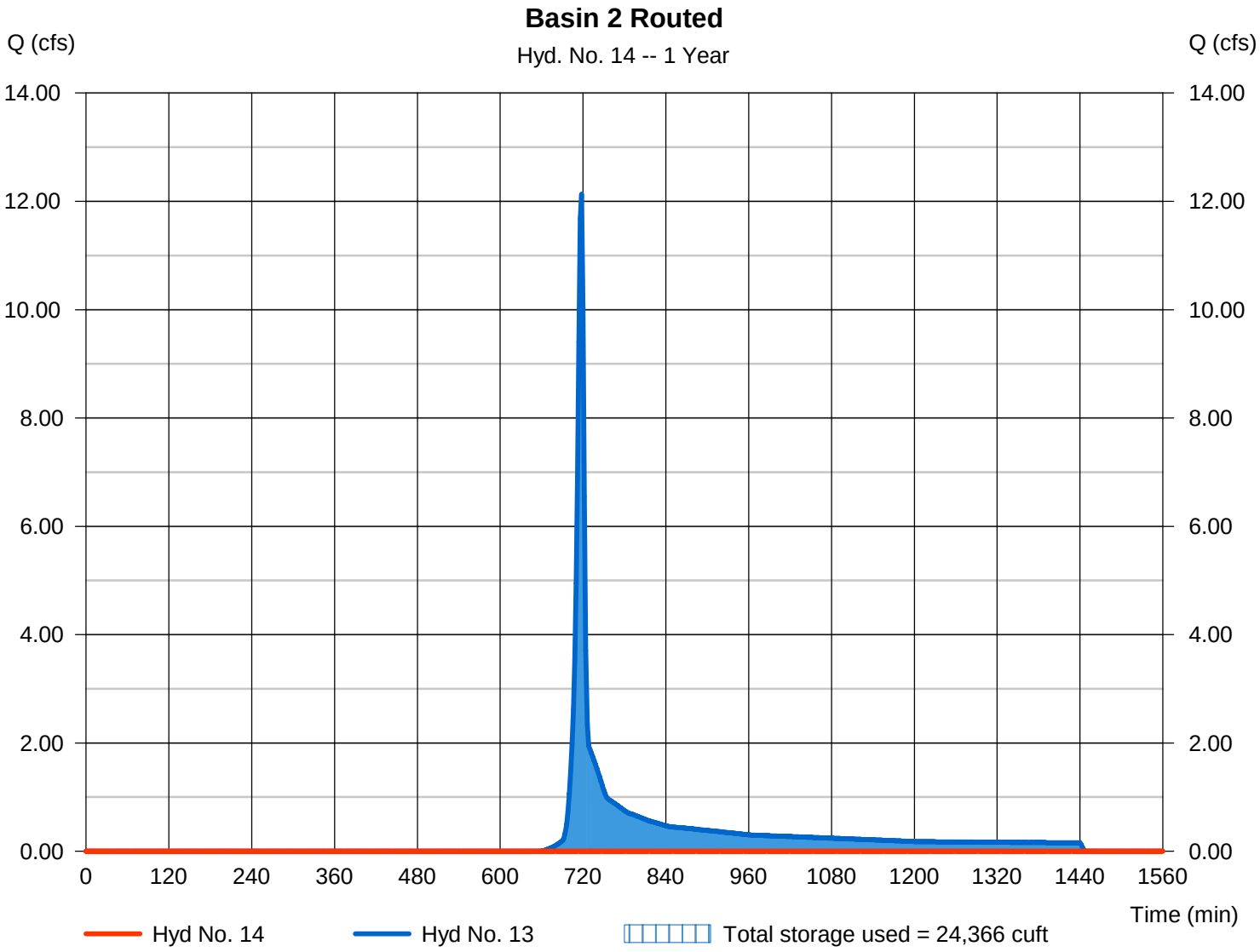
Hydrograph Report

Hyd. No. 14

Basin 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	13 - Post Basin 2	Max. Elevation	=	308.25 ft
Reservoir name	=	Basin 2	Max. Storage	=	24,366 cuft

Storage Indication method used.



Pond Report

Pond No. 3 - Basin 2

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 306.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	306.00	8,255	0	0
2.00	308.00	12,443	20,698	20,698
4.00	310.00	16,673	29,116	49,814
6.00	312.00	21,110	37,783	87,597

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 304.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

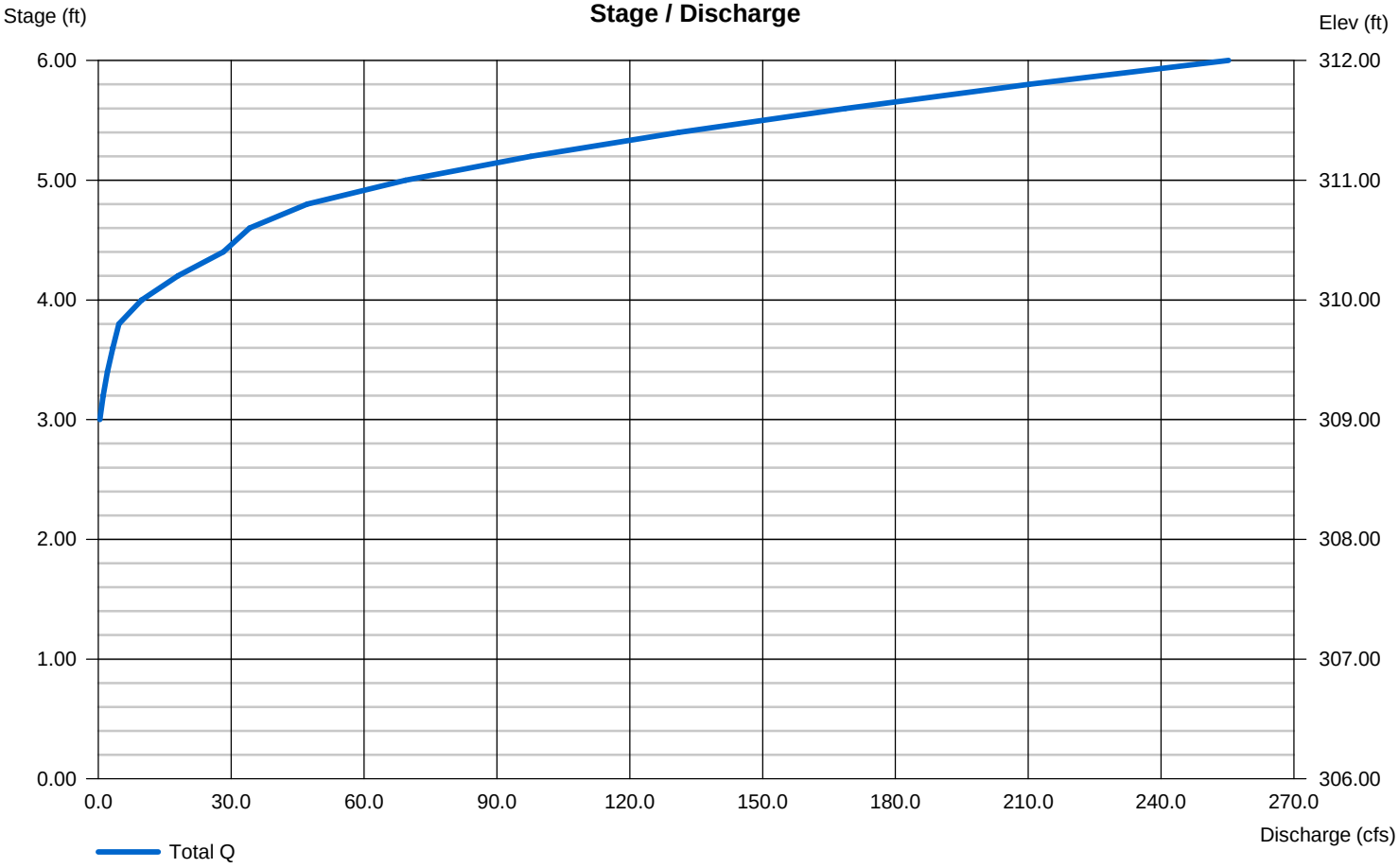
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	1.50	50.00	0.00
Crest El. (ft)	= 309.80	308.85	310.60	0.00
Weir Coeff.	= 3.33	3.33	2.60	3.33
Weir Type	= 1	Rect	Broad	---
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

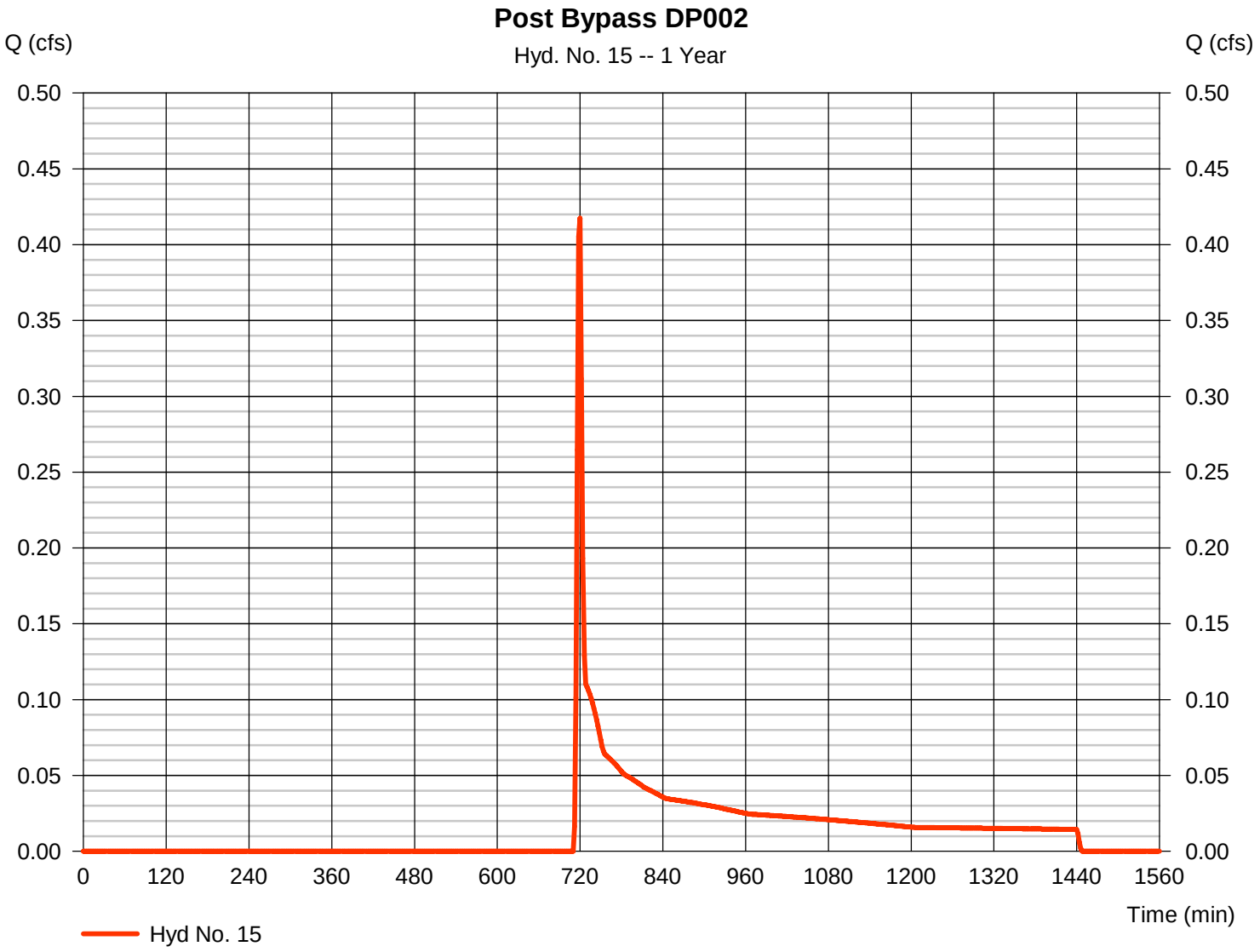


Hydrograph Report

Hyd. No. 15

Post Bypass DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.417 cfs
Storm frequency	=	1 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	1,355 cuft
Drainage area	=	1.540 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

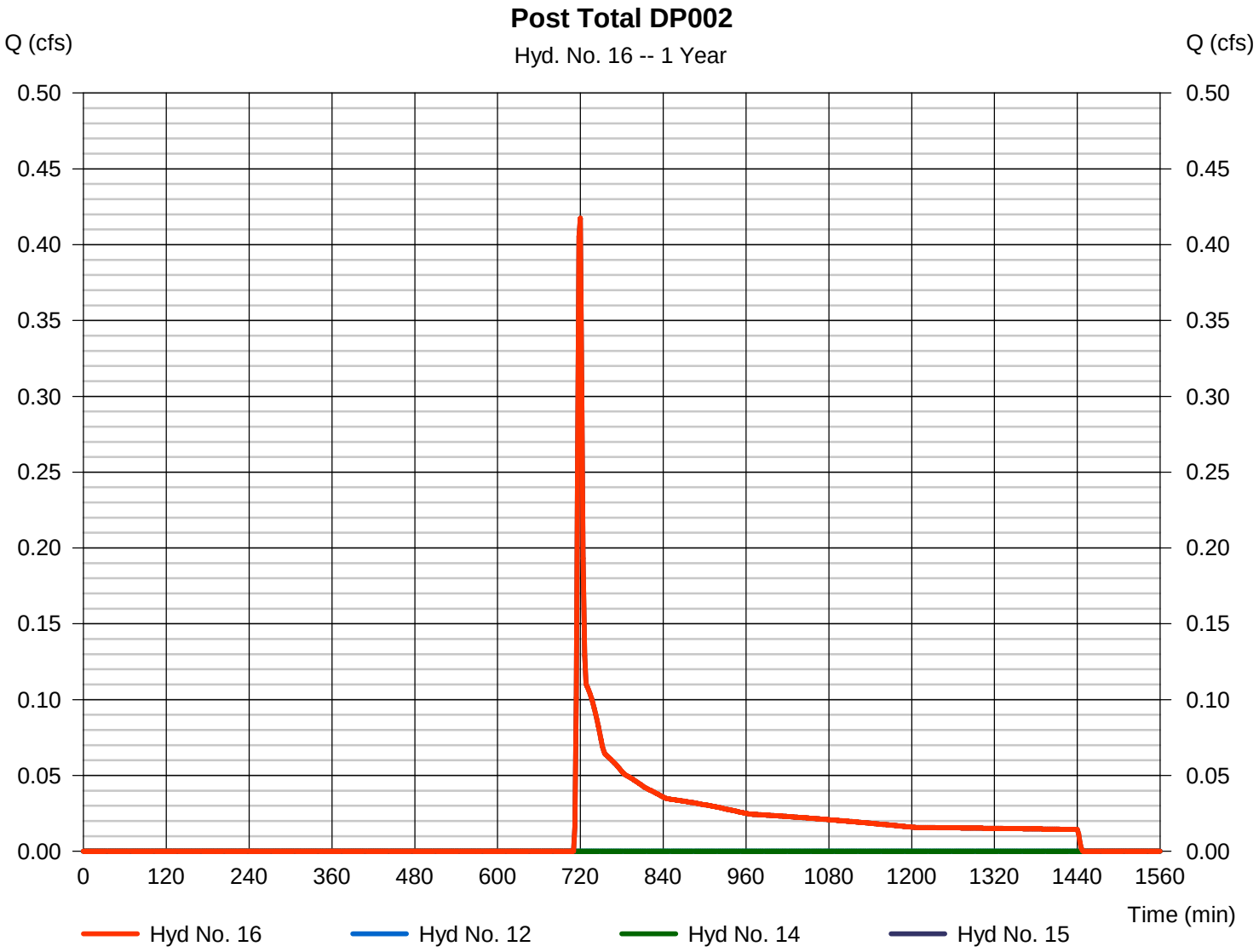


Hydrograph Report

Hyd. No. 16

Post Total DP002

Hydrograph type	= Combine	Peak discharge	= 0.417 cfs
Storm frequency	= 1 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 1,355 cuft
Inflow hyds.	= 12, 14, 15	Contrib. drain. area	= 1.540 ac



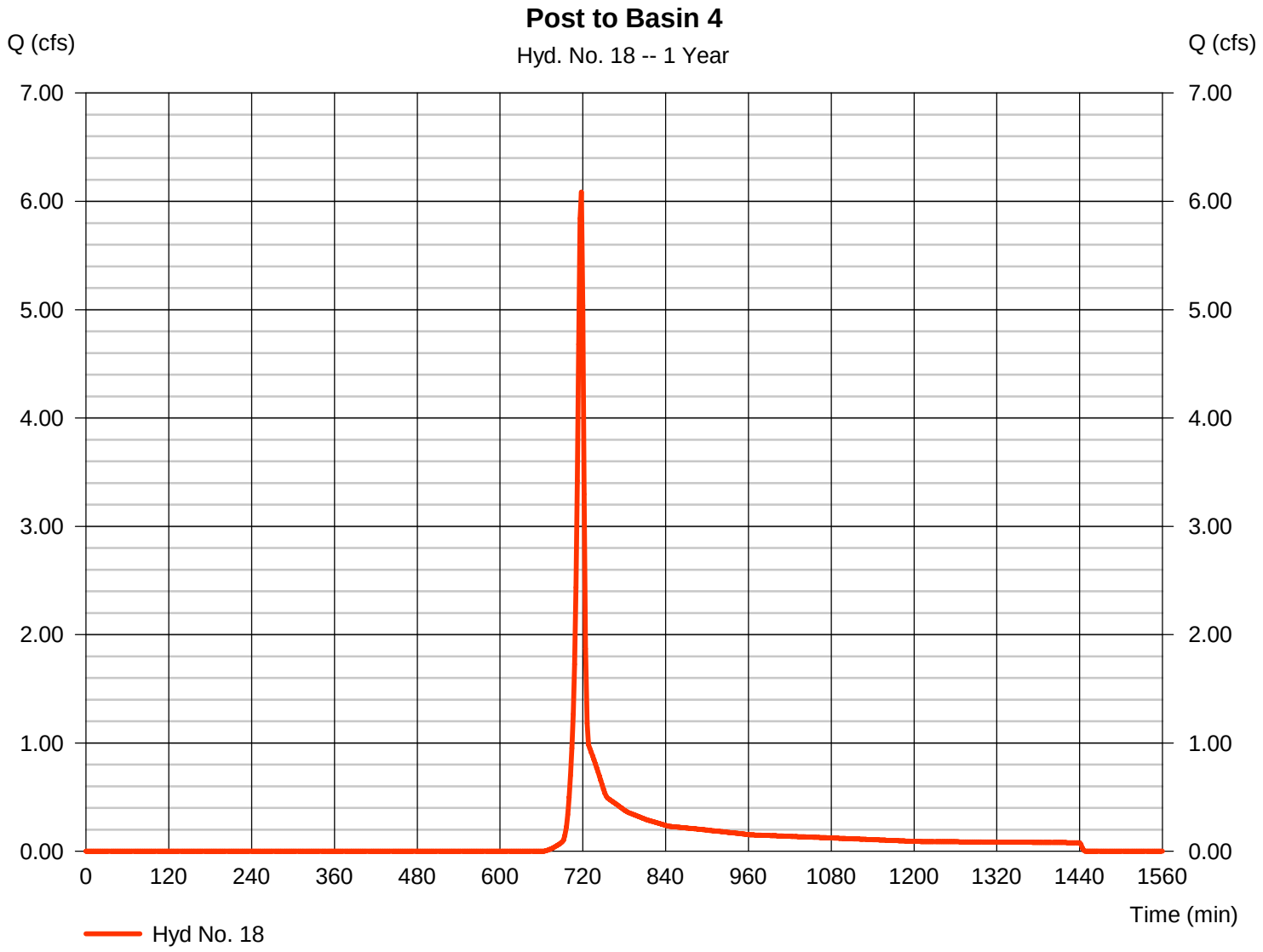
Hydrograph Report

Hyd. No. 18

Post to Basin 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.085 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	12,240 cuft
Drainage area	=	4.420 ac	Curve number	=	75.9*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.910 x 61) + (2.270 x 98) + (3.040 x 78)] / 4.420



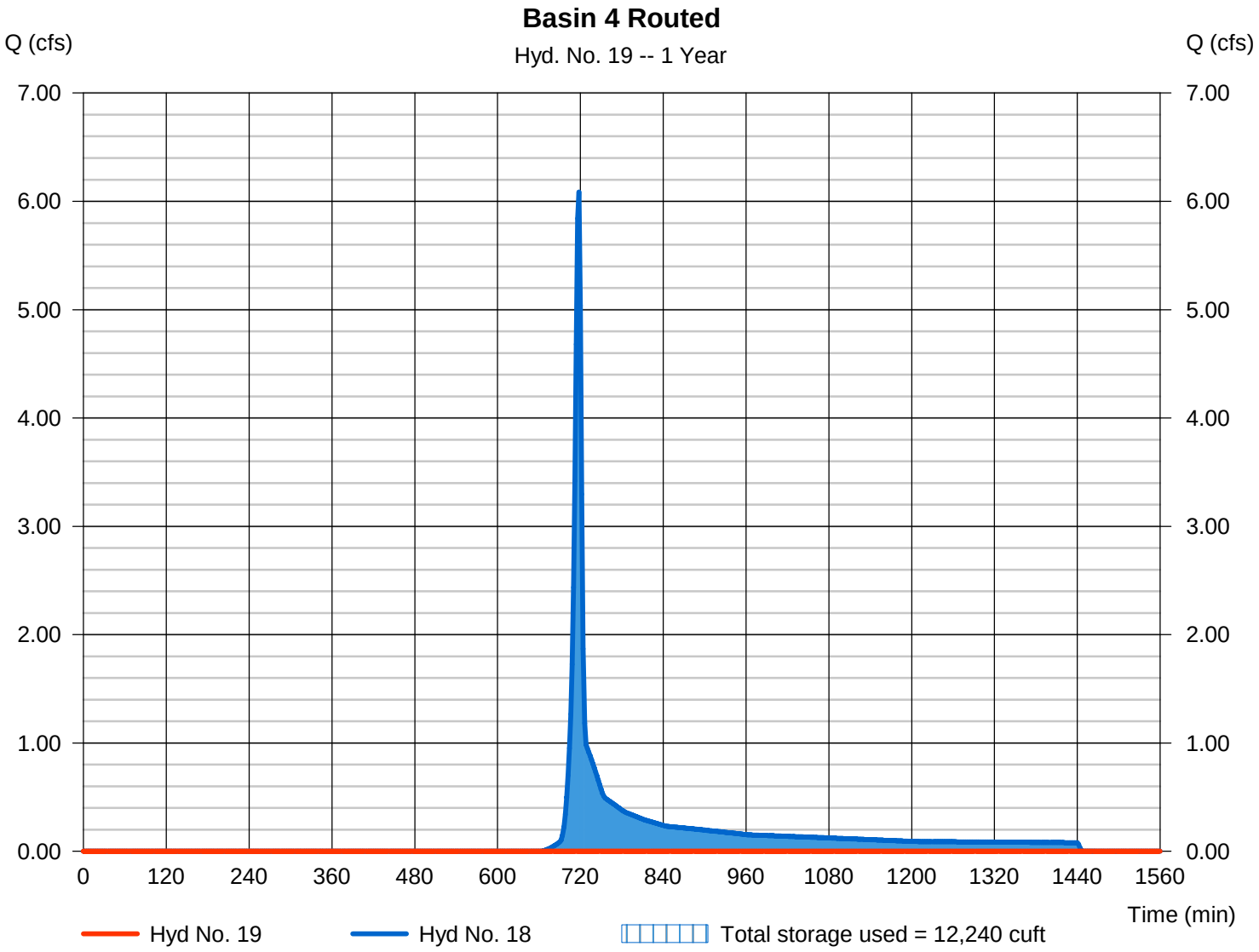
Hydrograph Report

Hyd. No. 19

Basin 4 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	18 - Post to Basin 4	Max. Elevation	=	346.01 ft
Reservoir name	=	Basin 4	Max. Storage	=	12,240 cuft

Storage Indication method used.



Pond Report

Pond No. 7 - Basin 4

Pond Data

Contours -User-defined contour areas. Average end area method. Begining Elevation = 342.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	342.00	1,300	0	0
0.20	342.20	1,300	103	103
0.40	342.40	1,300	103	207
0.60	342.60	1,300	103	310
0.80	342.80	1,300	103	414
1.00	342.99	1,300	103	517
1.19	343.19	1,300	103	621
1.39	343.39	1,300	103	724
1.59	343.59	1,300	103	828
1.79	343.79	1,300	103	931
1.99	343.99	1,300	103	1,035
2.00	344.00	4,413	29	1,063
4.00	346.00	6,717	11,130	12,193
6.00	348.00	9,246	15,963	28,156
8.00	350.00	12,000	21,246	49,402

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	12.00	0.00	0.00
Span (in)	= 18.00	12.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 344.00	346.25	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

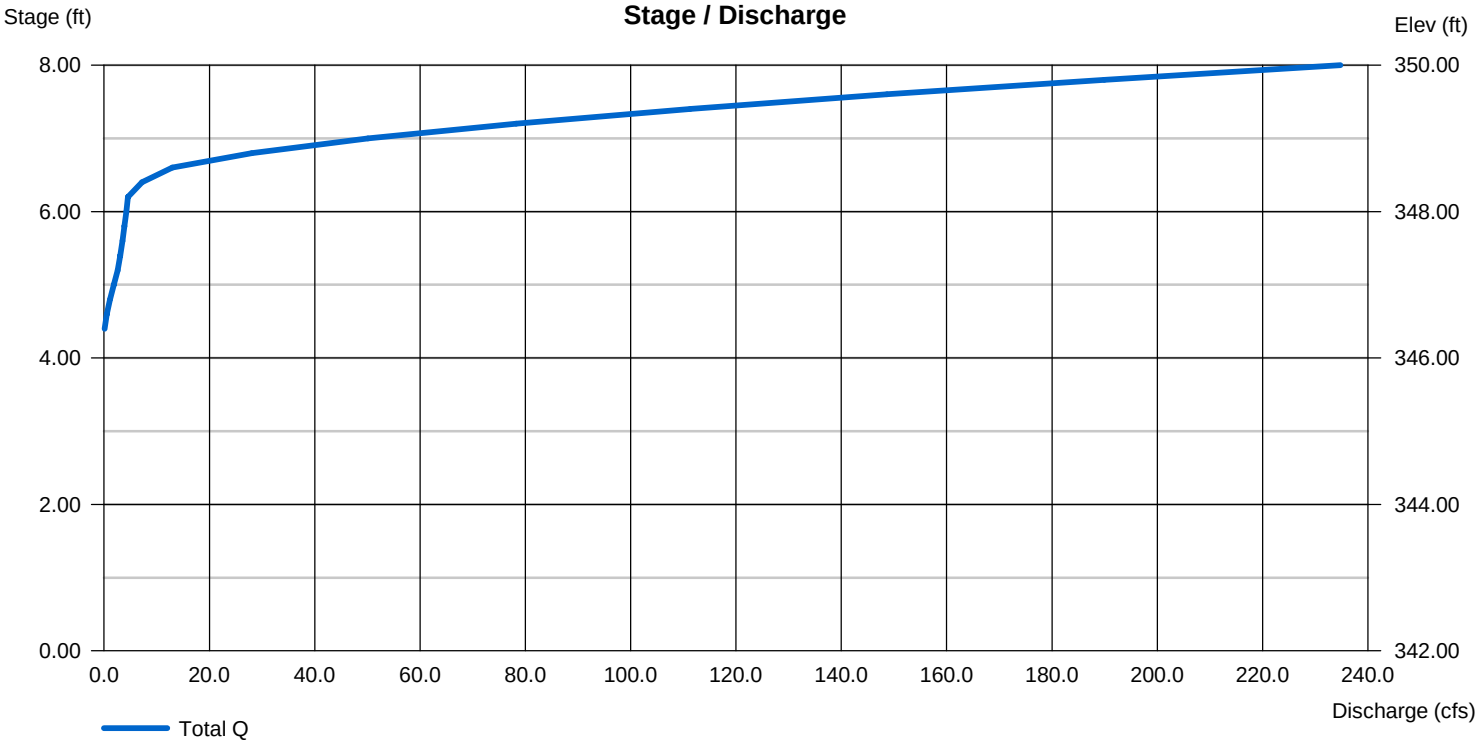
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	50.00	0.00
Crest El. (ft)	= 348.25	0.00	348.60	0.00
Weir Coeff.	= 3.33	3.33	2.60	3.33
Weir Type	= 1	---	Broad	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



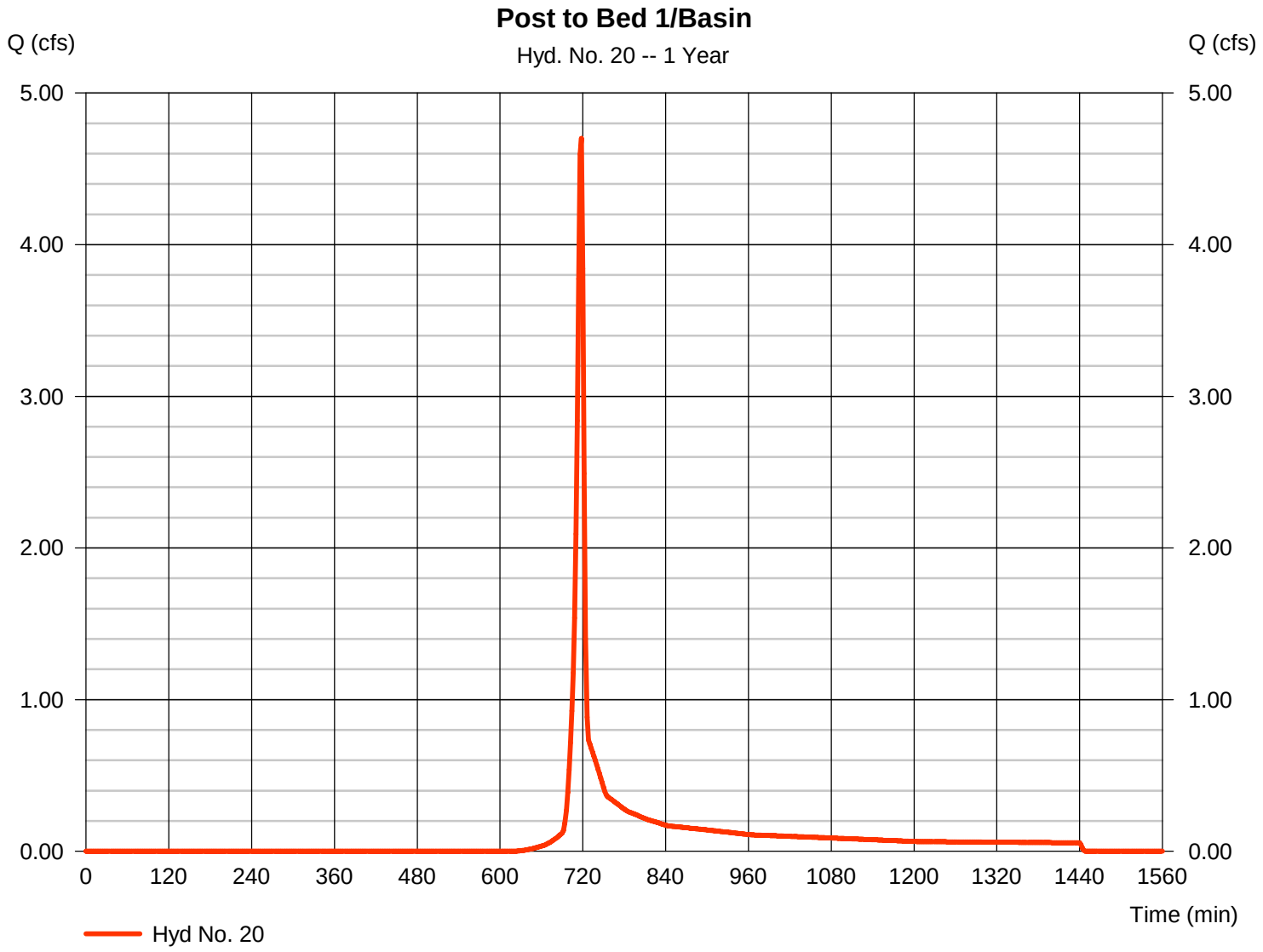
Hydrograph Report

Hyd. No. 20

Post to Bed 1/Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.701 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	9,401 cuft
Drainage area	=	2.820 ac	Curve number	=	79.1*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.910 x 61) + (2.270 x 98) + (3.040 x 78)] / 2.820



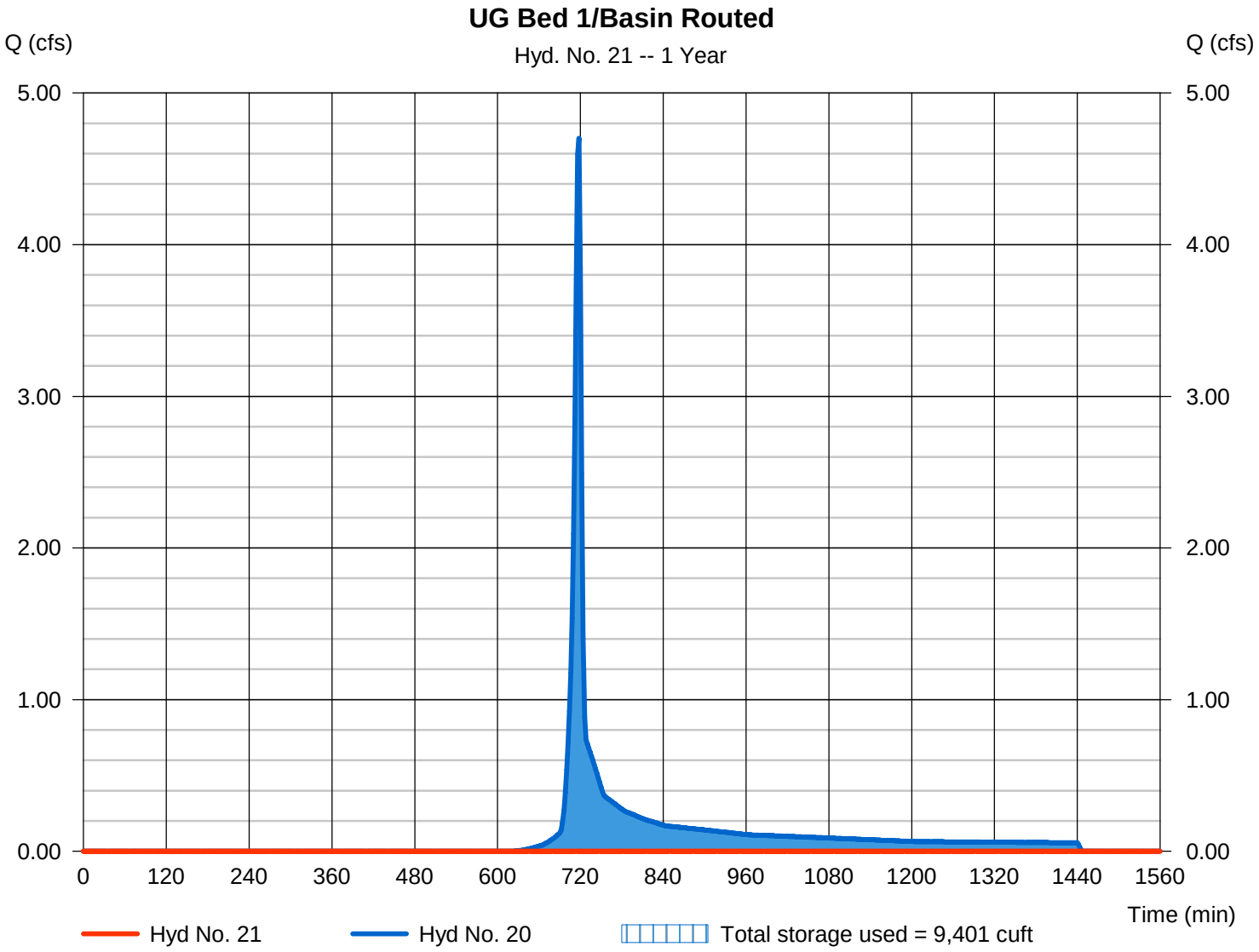
Hydrograph Report

Hyd. No. 21

UG Bed 1/Basin Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	1 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	20 - Post to Bed 1/Basin	Max. Elevation	=	339.59 ft
Reservoir name	=	UG Bed 1/Basin	Max. Storage	=	9,401 cuft

Storage Indication method used.



Pond Report

Pond No. 6 - UG Bed 1/Basin

Pond Data

Contours -User-defined contour areas. Average end area method. Begin Elevation = 336.00 ft

Custom -Bottom elev = 336.00 ft, Depth = 3.00 ft, Volume = 31,678 cuft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	336.00	5,625	0	0
0.30	336.30	5,625	675	675
0.60	336.60	5,625	675	1,350
0.90	336.90	5,625	675	2,025
1.20	337.20	5,625	675	2,700
1.50	337.50	5,625	675	3,375
1.80	337.80	5,625	675	4,050
2.10	338.10	5,625	675	4,725
2.40	338.40	5,625	675	5,400
2.70	338.70	5,625	675	6,075
3.00	339.00	5,625	675	6,750
4.00	340.00	3,380	4,503	11,253
6.00	342.00	5,050	8,430	19,683
8.00	344.00	6,945	11,995	31,678

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	12.00	0.00	0.00
Span (in)	= 15.00	18.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 336.00	340.20	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

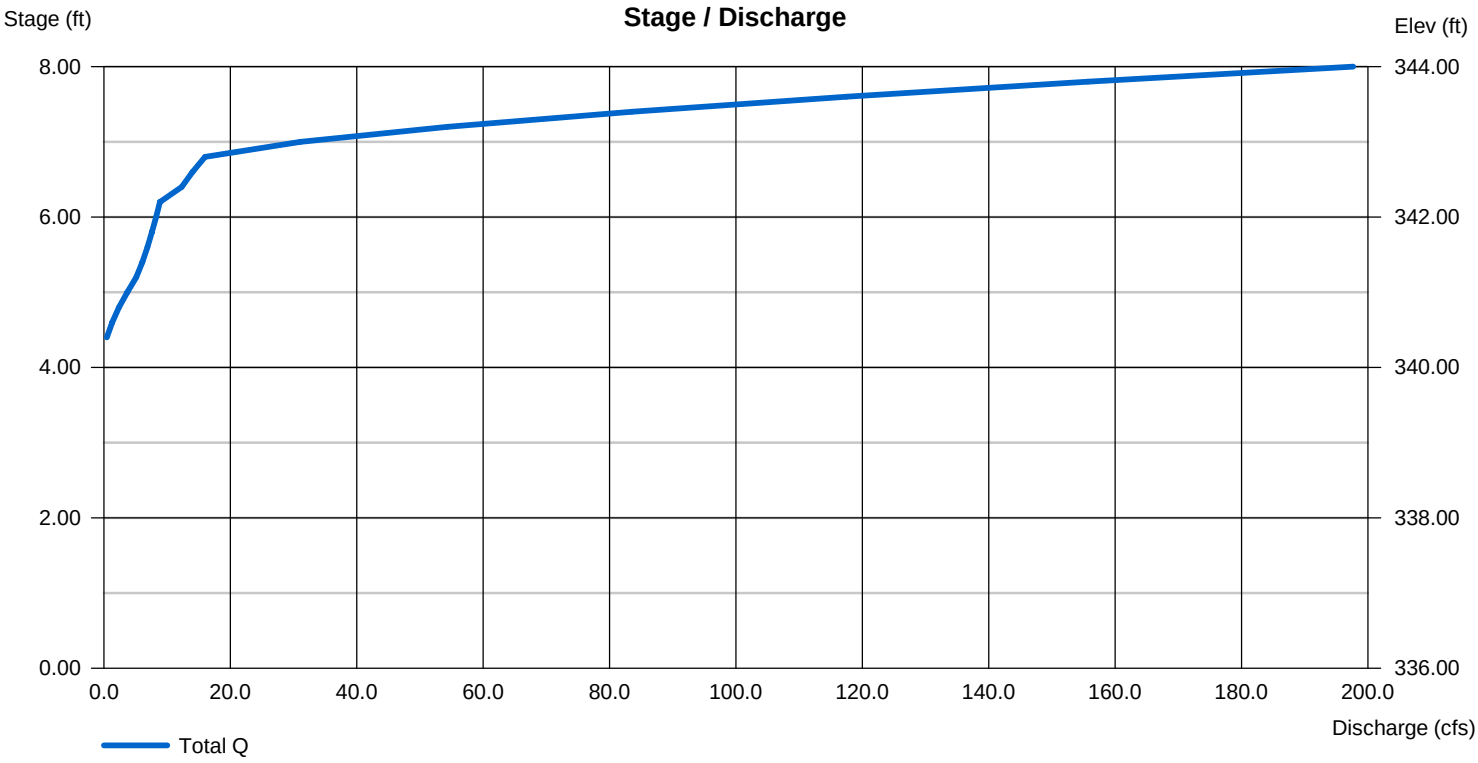
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.00	0.00	50.00	0.00
Crest El. (ft)	= 342.20	0.00	342.75	0.00
Weir Coeff.	= 3.33	3.33	2.60	3.33
Weir Type	= 1	---	Broad	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

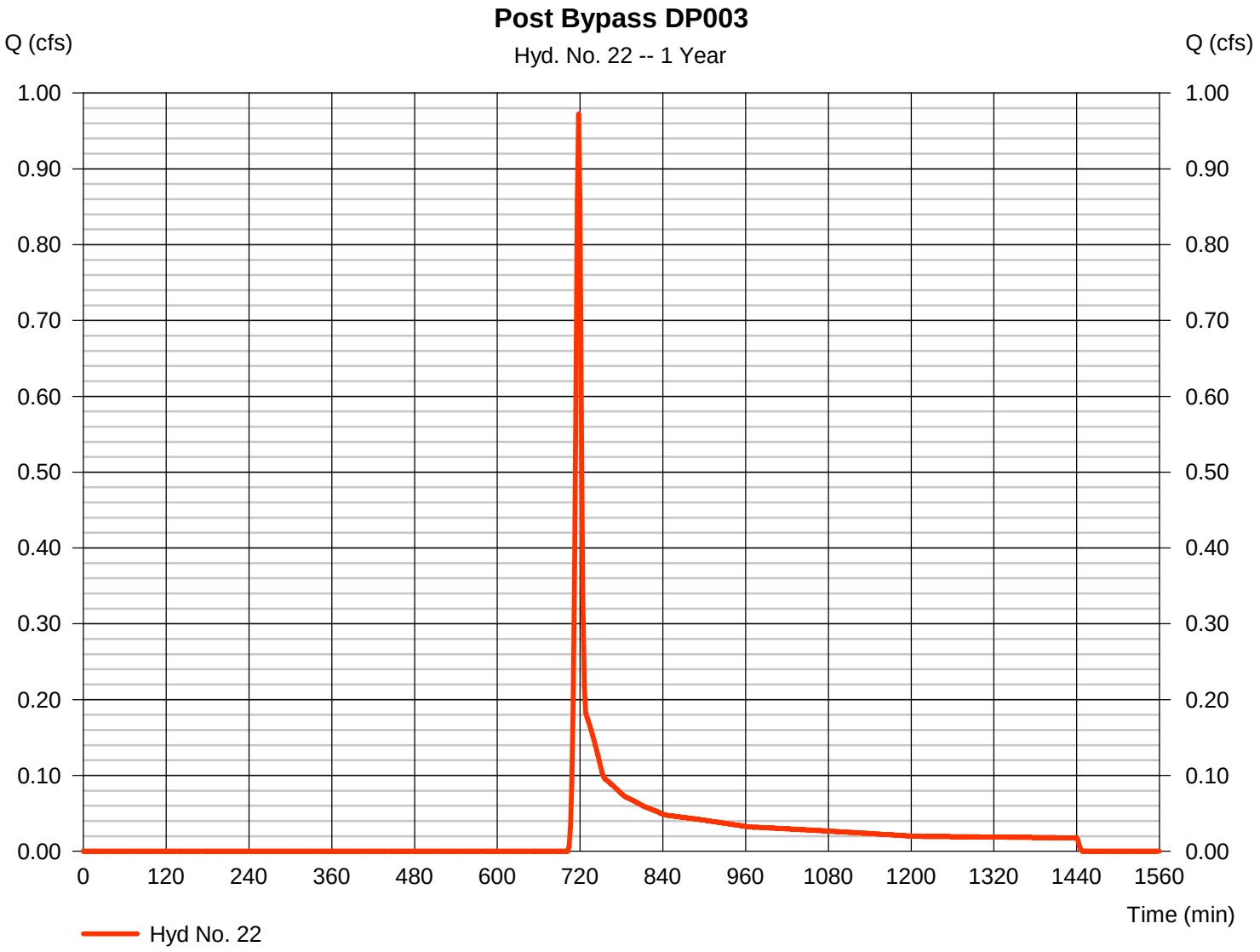


Hydrograph Report

Hyd. No. 22

Post Bypass DP003

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.972 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	2,149 cuft
Drainage area	=	1.340 ac	Curve number	=	67.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

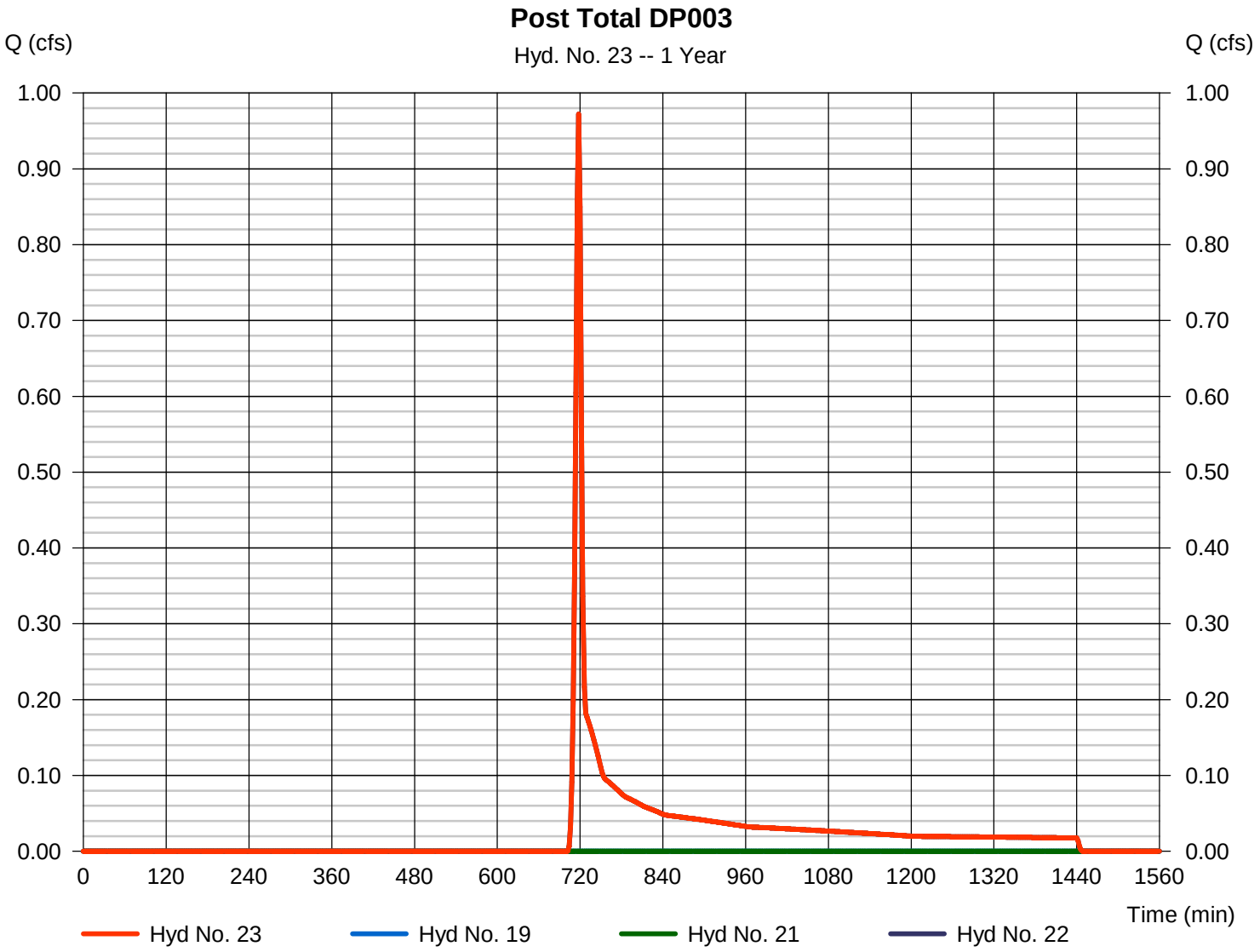


Hydrograph Report

Hyd. No. 23

Post Total DP003

Hydrograph type	= Combine	Peak discharge	= 0.972 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 2,149 cuft
Inflow hyds.	= 19, 21, 22	Contrib. drain. area	= 1.340 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

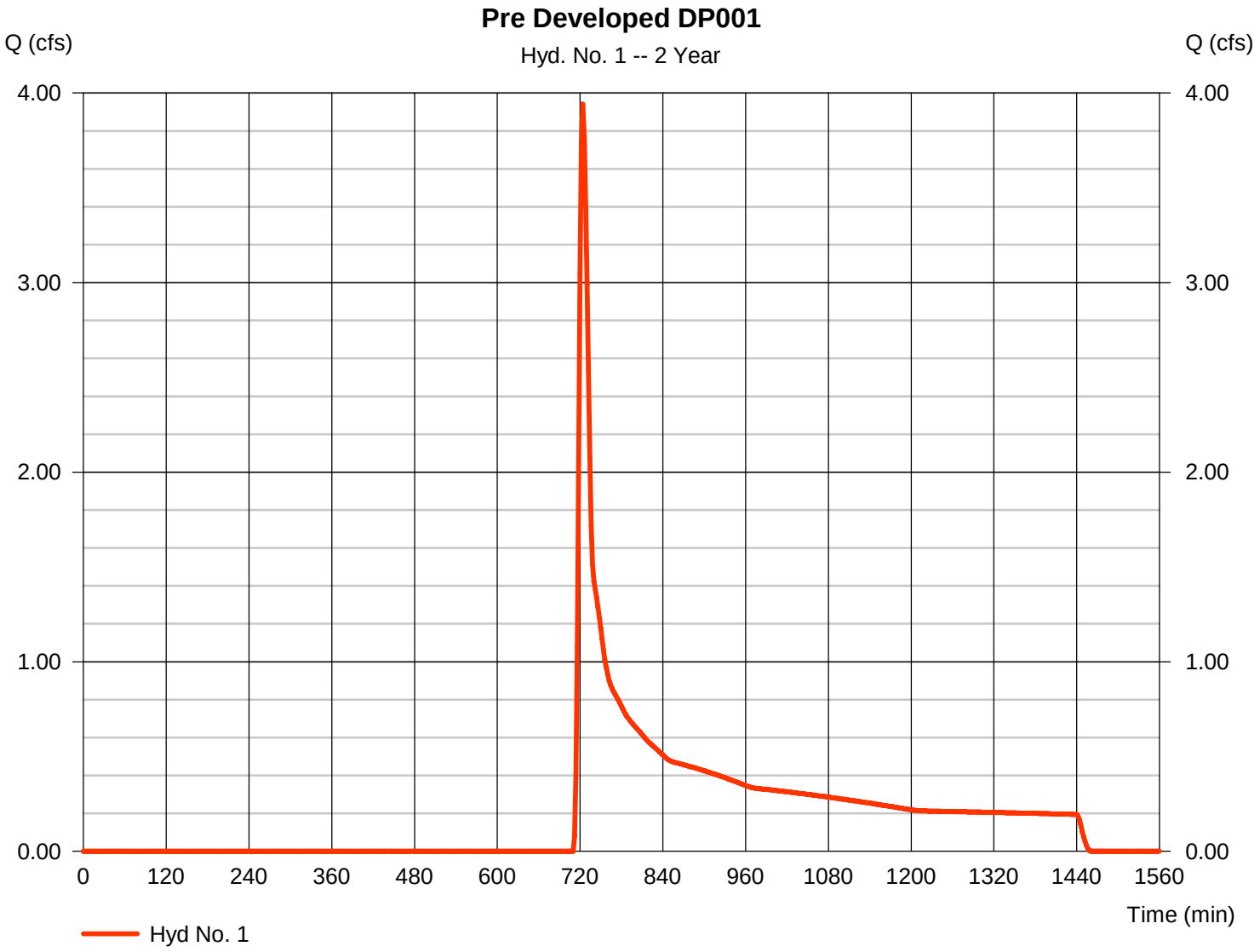
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.942	2	724	18,785	------	------	------	Pre Developed DP001
2	SCS Runoff	6.847	2	724	27,873	------	------	------	Pre Developed DP002
3	SCS Runoff	8.022	2	722	22,888	------	------	------	Pre Developed DP003
4	SCS Runoff	0.566	2	718	1,326	------	------	------	Pre Developed DP003 ORA
5	SCS Runoff	18.03	2	718	36,518	------	------	------	Post Basin 3
6	Reservoir	0.000	2	n/a	0	5	317.96	36,518	Basin 3 Routed
7	SCS Runoff	1.146	2	718	2,583	------	------	------	Post Bypass DP001
8	Combine	1.146	2	718	2,583	6, 7	------	------	Post Total DP001
10	SCS Runoff	16.97	2	718	34,254	------	------	------	Post Basin 1
11	Reservoir	0.000	2	n/a	0	10	322.23	34,254	Basin 1 Upper Routed
12	Reservoir	0.000	2	n/a	0	11	302.20	0.000	Basin 1 Lower Routed
13	SCS Runoff	17.09	2	718	34,170	------	------	------	Post Basin 2
14	Reservoir	0.120	2	1444	1,815	13	308.88	33,546	Basin 2 Routed
15	SCS Runoff	0.956	2	718	2,327	------	------	------	Post Bypass DP002
16	Combine	0.956	2	718	4,142	12, 14, 15	------	------	Post Total DP002
18	SCS Runoff	8.620	2	718	17,240	------	------	------	Post to Basin 4
19	Reservoir	0.097	2	1440	3,434	18	346.39	15,343	Basin 4 Routed
20	SCS Runoff	6.430	2	718	12,890	------	------	------	Post to Bed 1/Basin
21	Reservoir	0.073	2	1390	793	20	340.23	12,231	UG Bed 1/Basin Routed
22	SCS Runoff	1.588	2	718	3,299	------	------	------	Post Bypass DP003
23	Combine	1.588	2	718	7,525	19, 21, 22	------	------	Post Total DP003

Hydrograph Report

Hyd. No. 1

Pre Developed DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.942 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	18,785 cuft
Drainage area	=	15.430 ac	Curve number	=	57.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

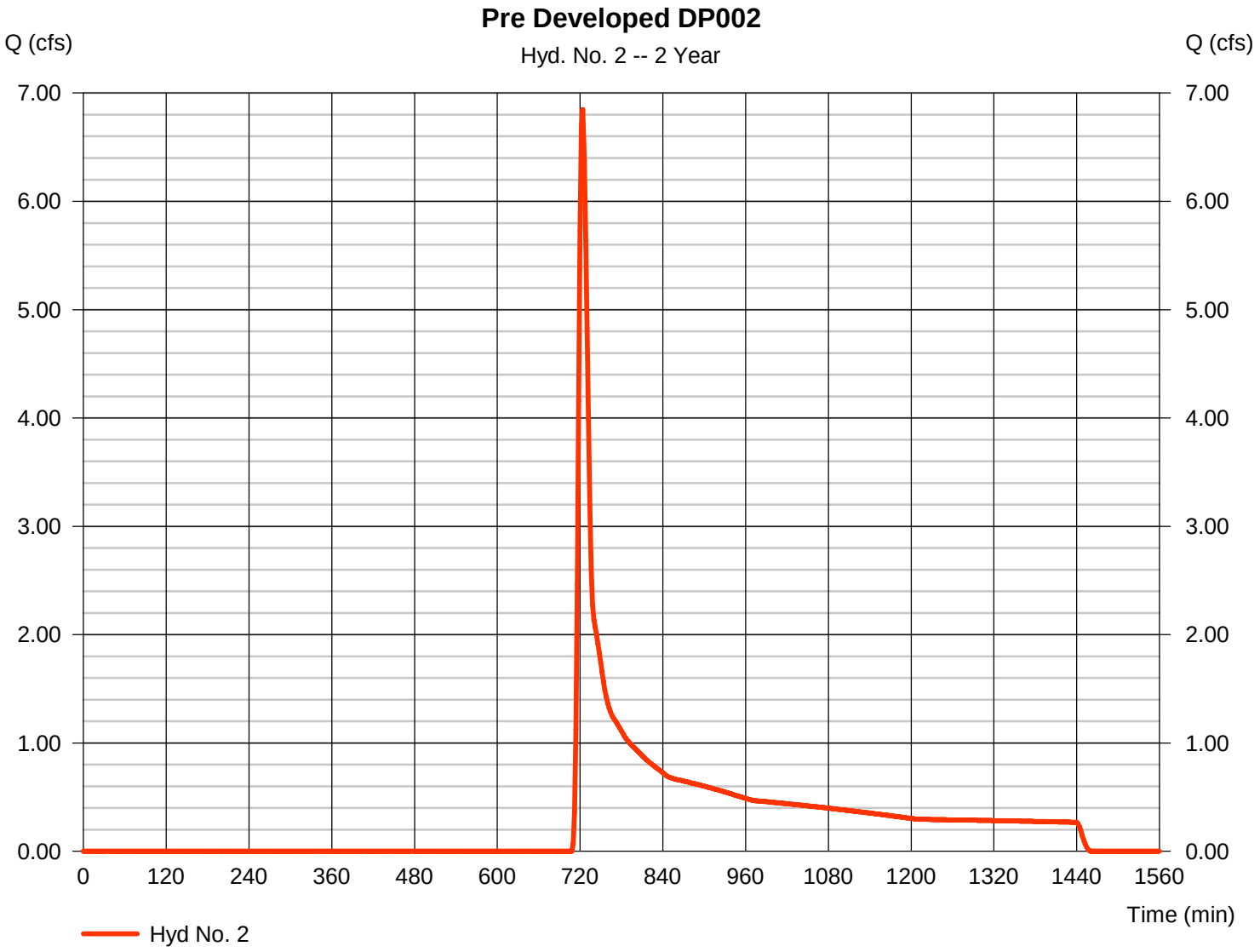


Hydrograph Report

Hyd. No. 2

Pre Developed DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.847 cfs
Storm frequency	=	2 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	27,873 cuft
Drainage area	=	19.210 ac	Curve number	=	59.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

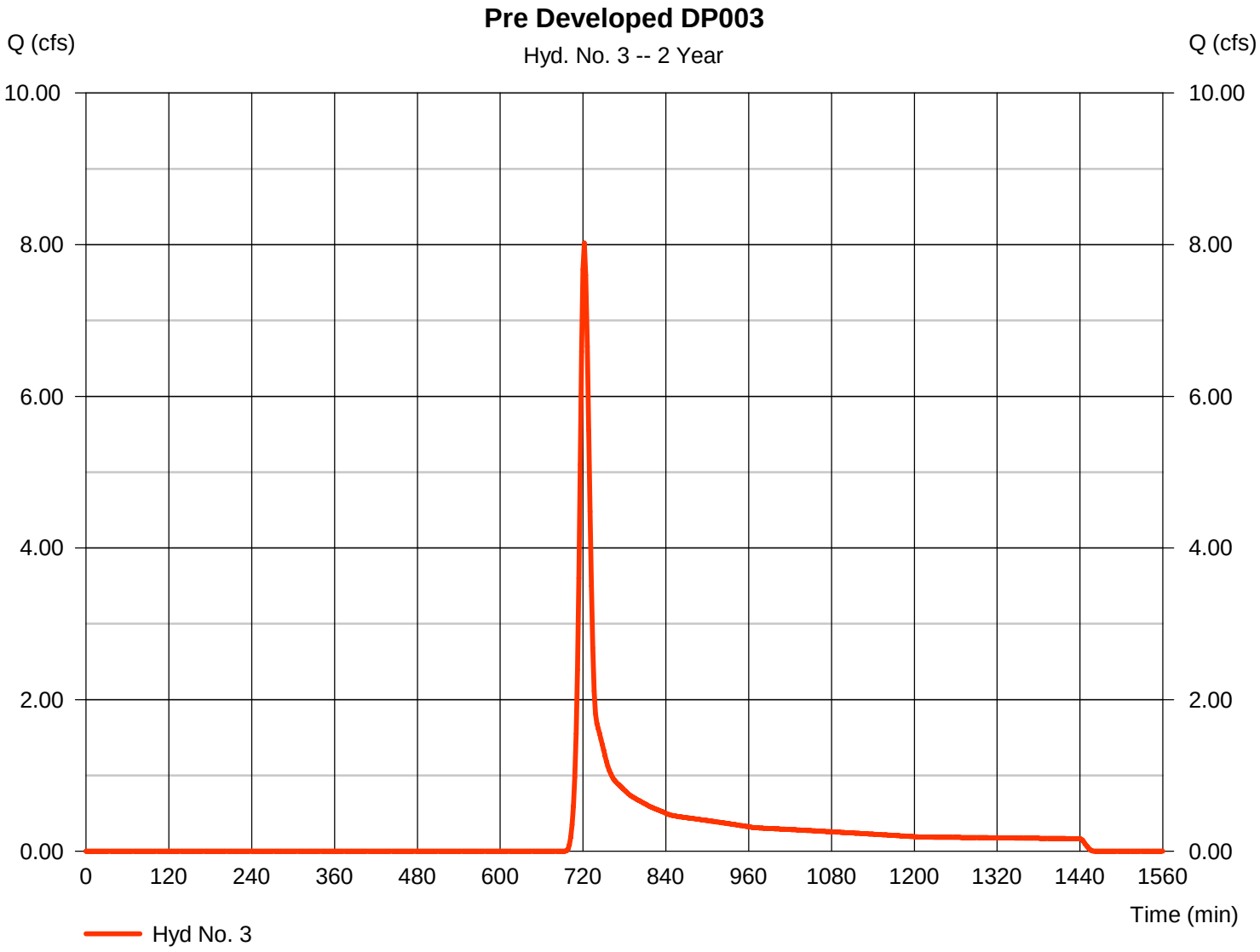


Hydrograph Report

Hyd. No. 3

Pre Developed DP003

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.022 cfs
Storm frequency	=	2 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	22,888 cuft
Drainage area	=	8.190 ac	Curve number	=	68.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

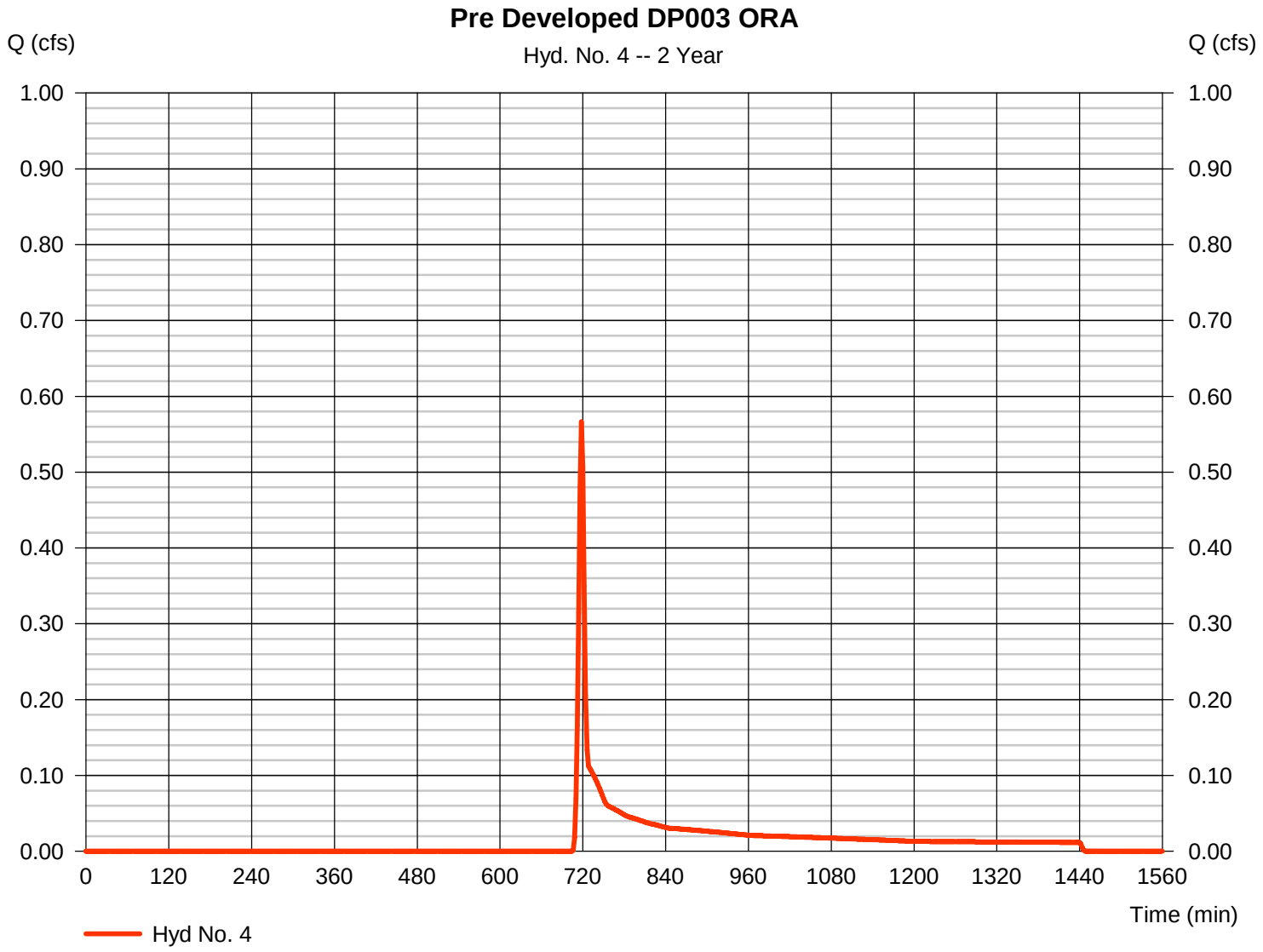


Hydrograph Report

Hyd. No. 4

Pre Developed DP003 ORA

Hydrograph type	= SCS Runoff	Peak discharge	= 0.566 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 1,326 cuft
Drainage area	= 0.810 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

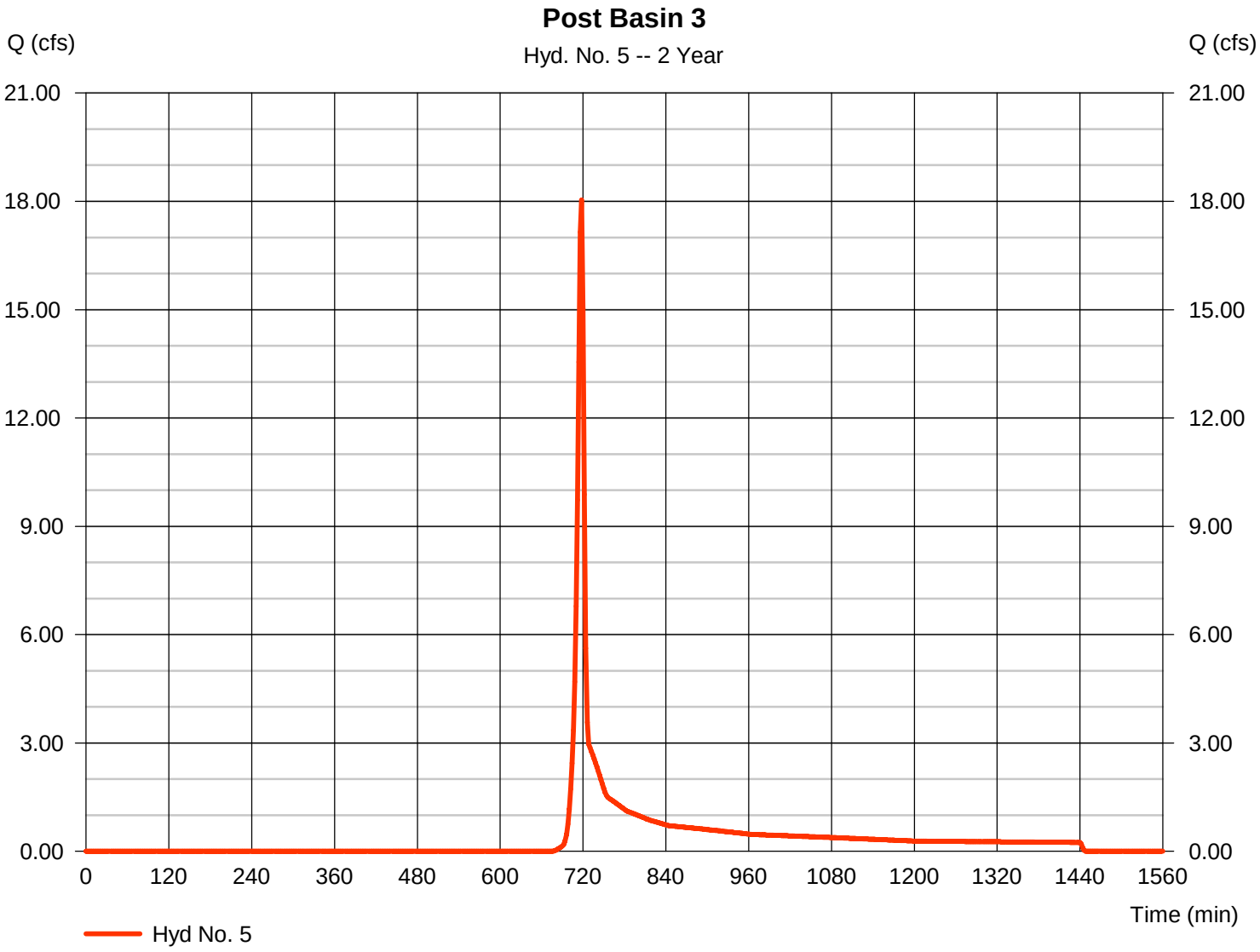


Hydrograph Report

Hyd. No. 5

Post Basin 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.03 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	36,518 cuft
Drainage area	=	12.150 ac	Curve number	=	71.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



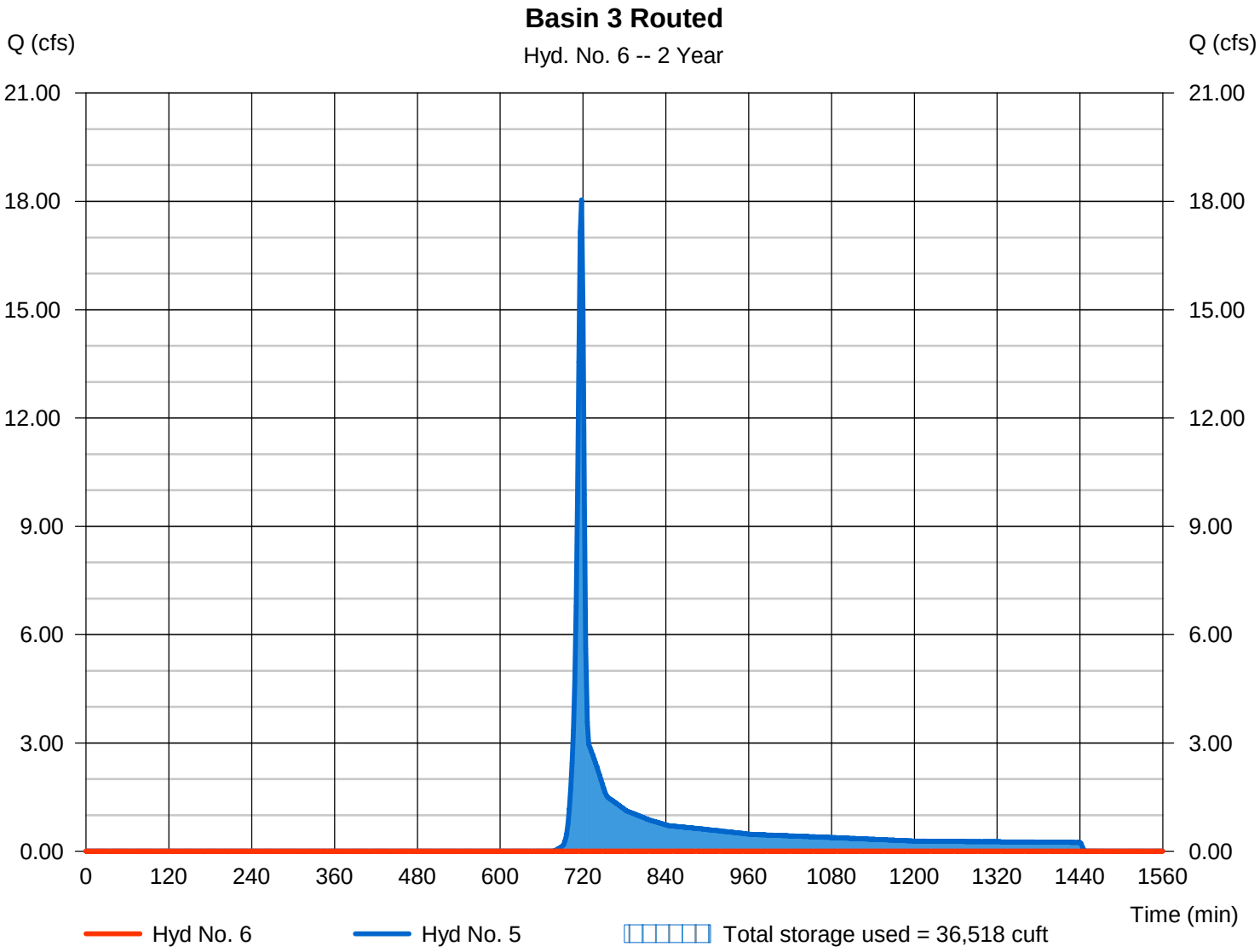
Hydrograph Report

Hyd. No. 6

Basin 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	5 - Post Basin 3	Max. Elevation	=	317.96 ft
Reservoir name	=	Basin 3	Max. Storage	=	36,518 cuft

Storage Indication method used.

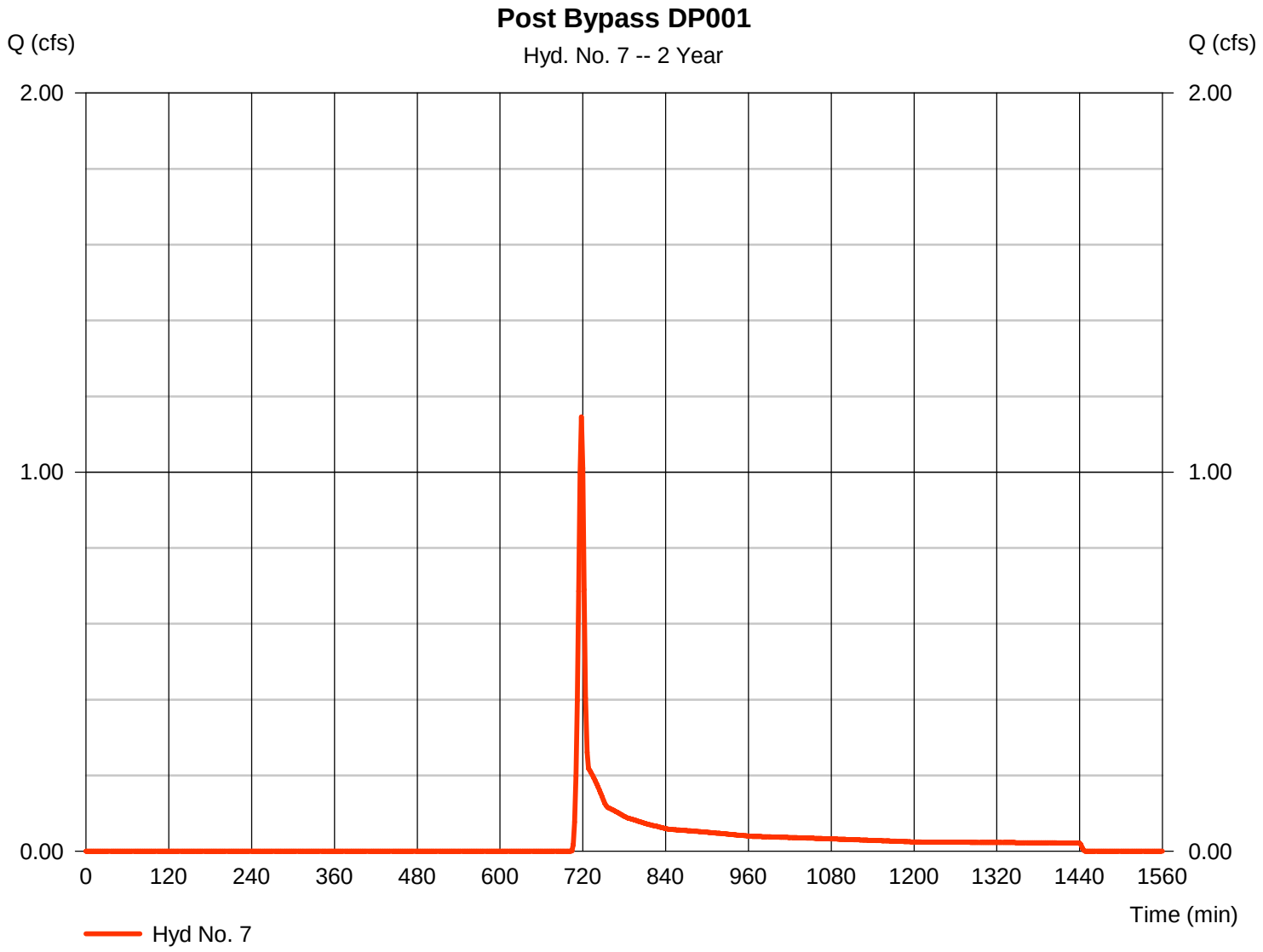


Hydrograph Report

Hyd. No. 7

Post Bypass DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.146 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	2,583 cuft
Drainage area	=	1.440 ac	Curve number	=	63.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

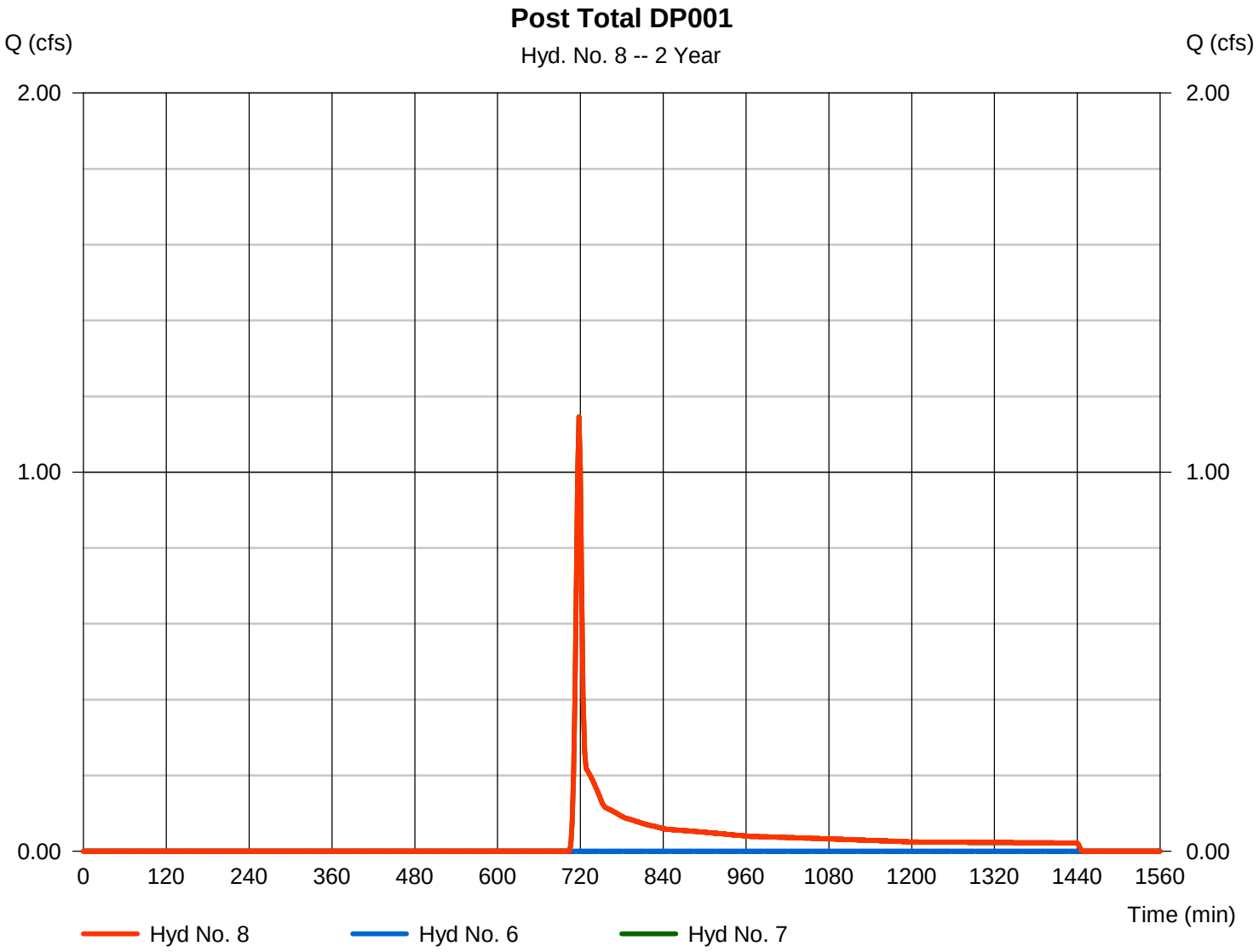


Hydrograph Report

Hyd. No. 8

Post Total DP001

Hydrograph type	= Combine	Peak discharge	= 1.146 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 2,583 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.440 ac

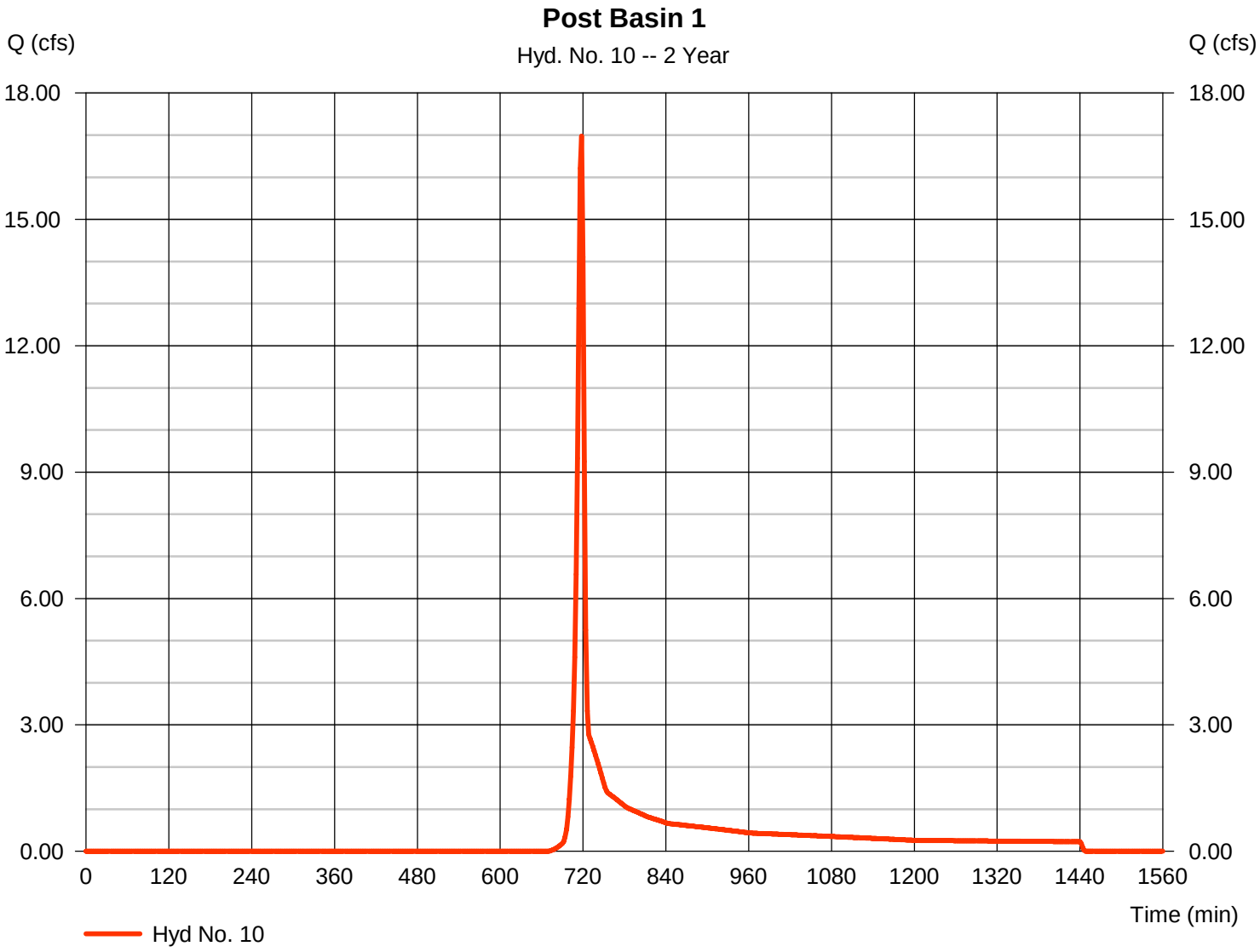


Hydrograph Report

Hyd. No. 10

Post Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	16.97 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	34,254 cuft
Drainage area	=	10.950 ac	Curve number	=	71.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



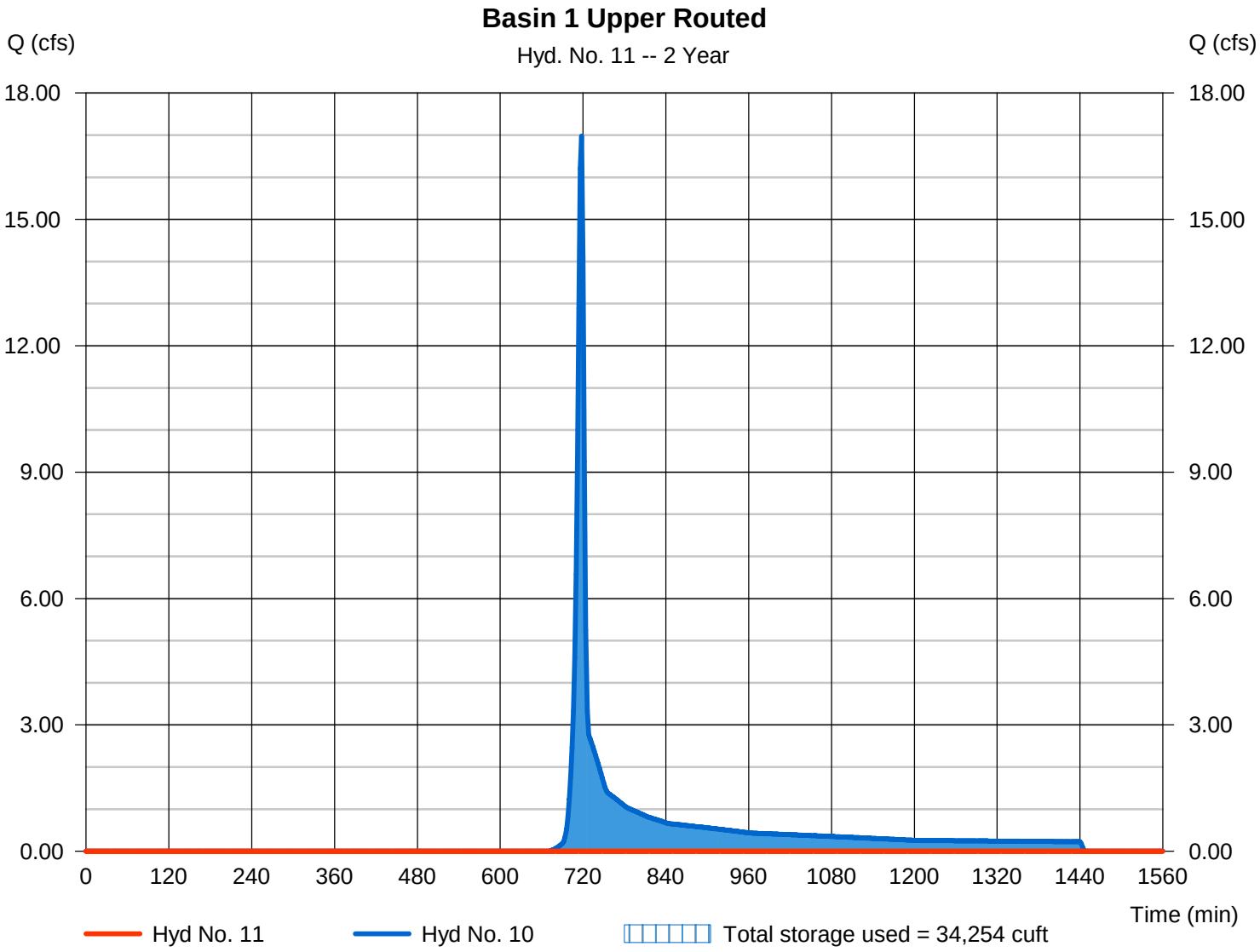
Hydrograph Report

Hyd. No. 11

Basin 1 Upper Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	10 - Post Basin 1	Max. Elevation	=	322.23 ft
Reservoir name	=	Basin 1 Upper	Max. Storage	=	34,254 cuft

Storage Indication method used.



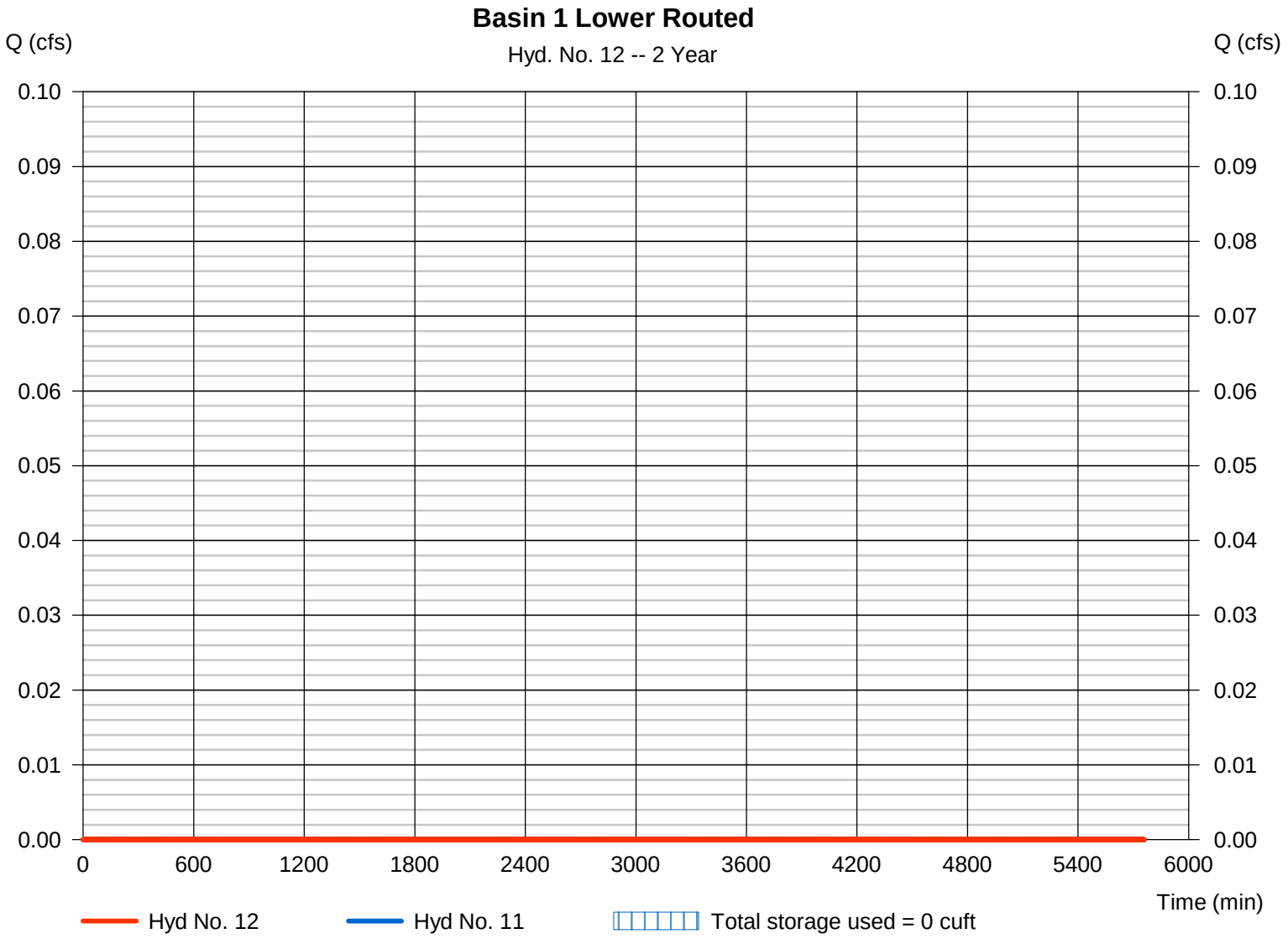
Hydrograph Report

Hyd. No. 12

Basin 1 Lower Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	n/a
Time interval	=	2 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	11 - Basin 1 Upper Routed	Max. Elevation	=	302.20 ft
Reservoir name	=	Basin 1 Lower	Max. Storage	=	0 cuft

Storage Indication method used.

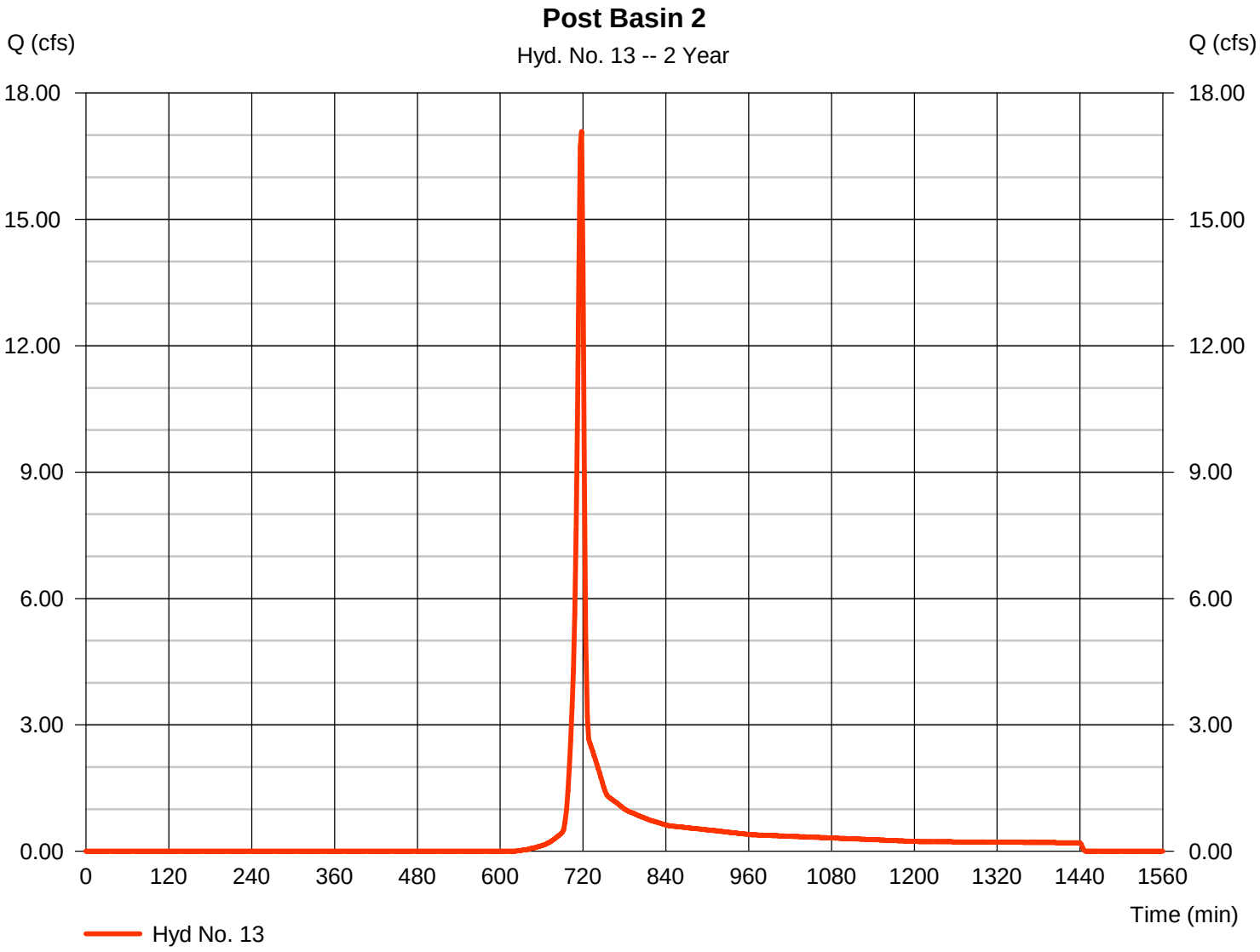


Hydrograph Report

Hyd. No. 13

Post Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	17.09 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	34,170 cuft
Drainage area	=	8.540 ac	Curve number	=	76.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



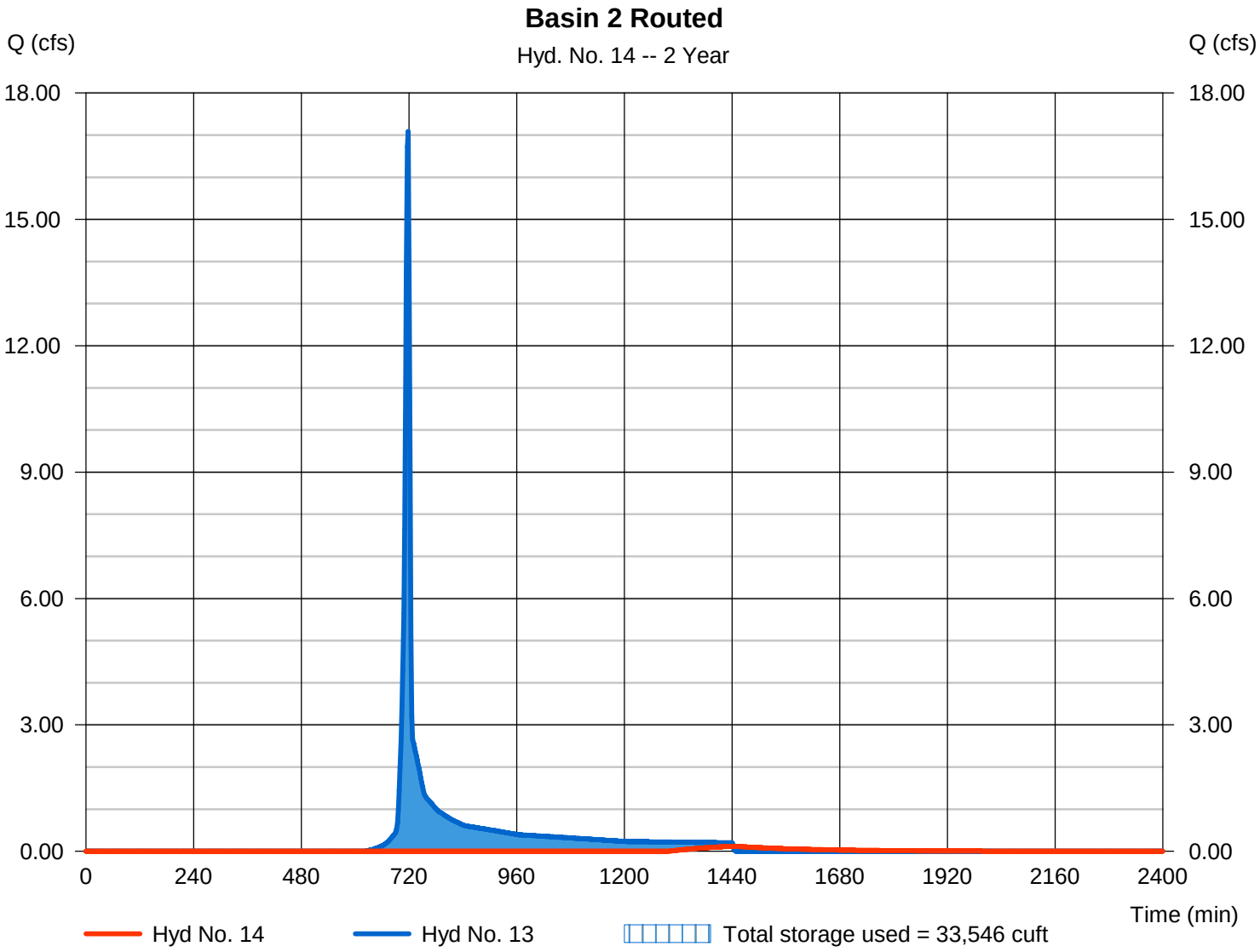
Hydrograph Report

Hyd. No. 14

Basin 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.120 cfs
Storm frequency	=	2 yrs	Time to peak	=	1444 min
Time interval	=	2 min	Hyd. volume	=	1,815 cuft
Inflow hyd. No.	=	13 - Post Basin 2	Max. Elevation	=	308.88 ft
Reservoir name	=	Basin 2	Max. Storage	=	33,546 cuft

Storage Indication method used.

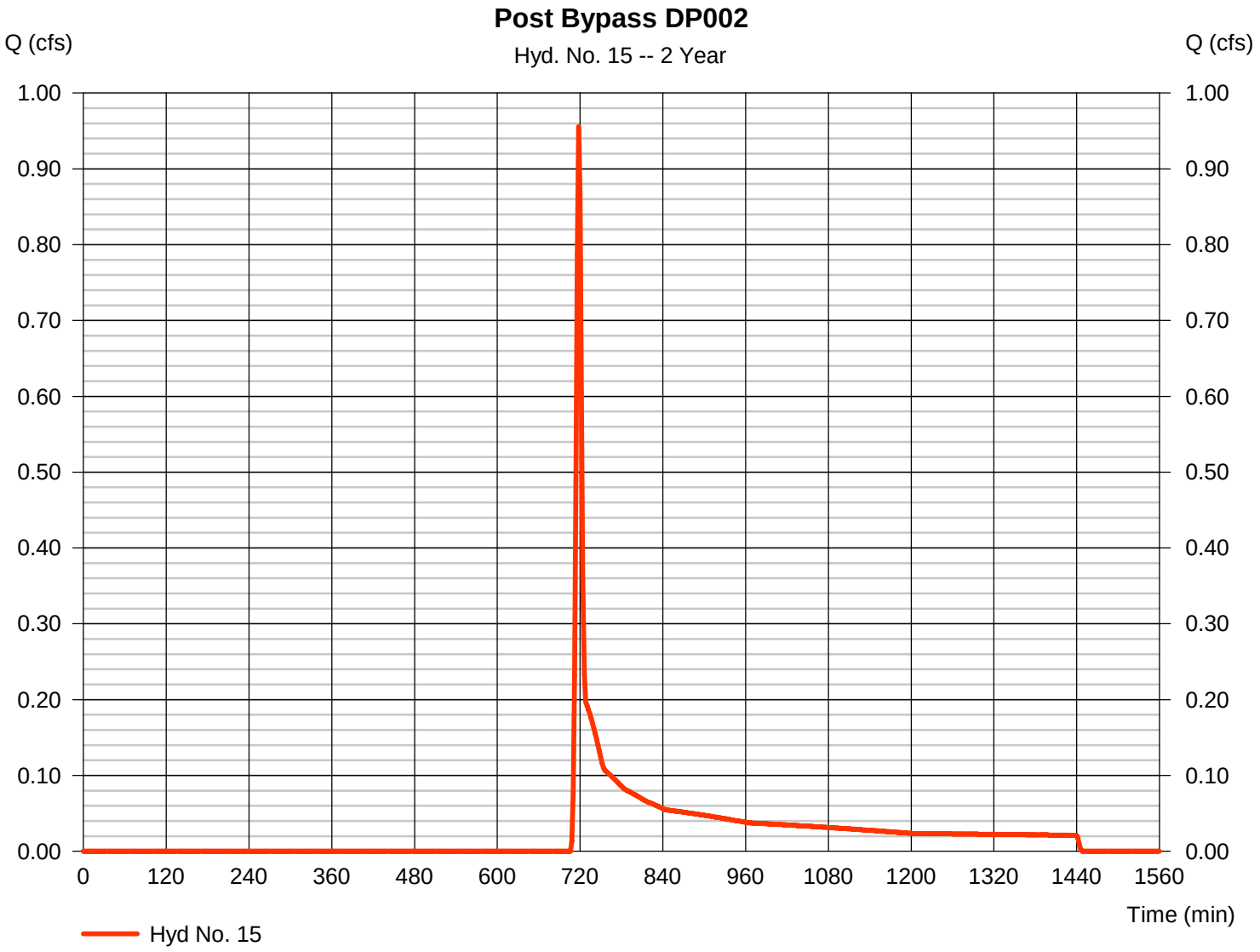


Hydrograph Report

Hyd. No. 15

Post Bypass DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.956 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	2,327 cuft
Drainage area	=	1.540 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

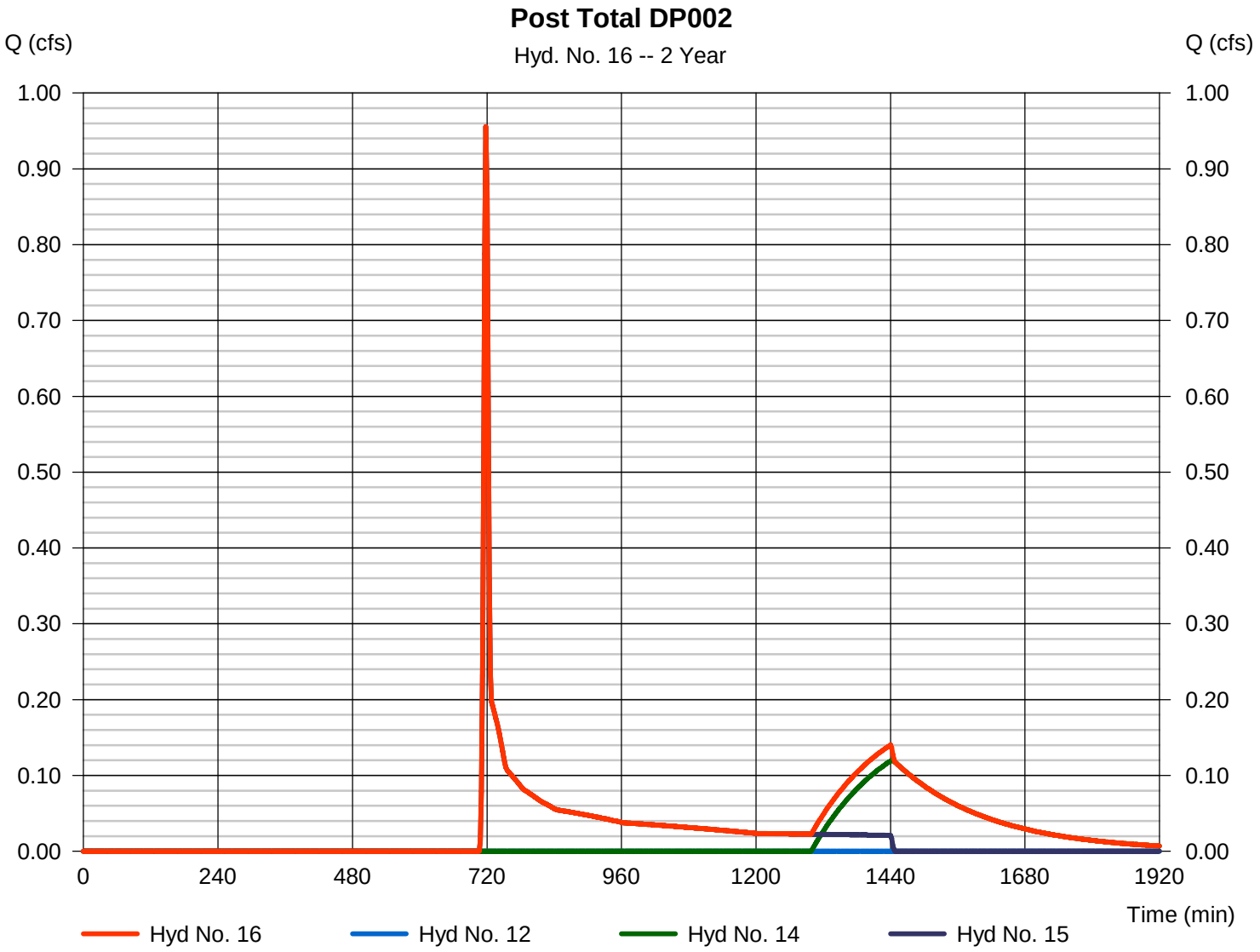


Hydrograph Report

Hyd. No. 16

Post Total DP002

Hydrograph type	= Combine	Peak discharge	= 0.956 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 4,142 cuft
Inflow hyds.	= 12, 14, 15	Contrib. drain. area	= 1.540 ac



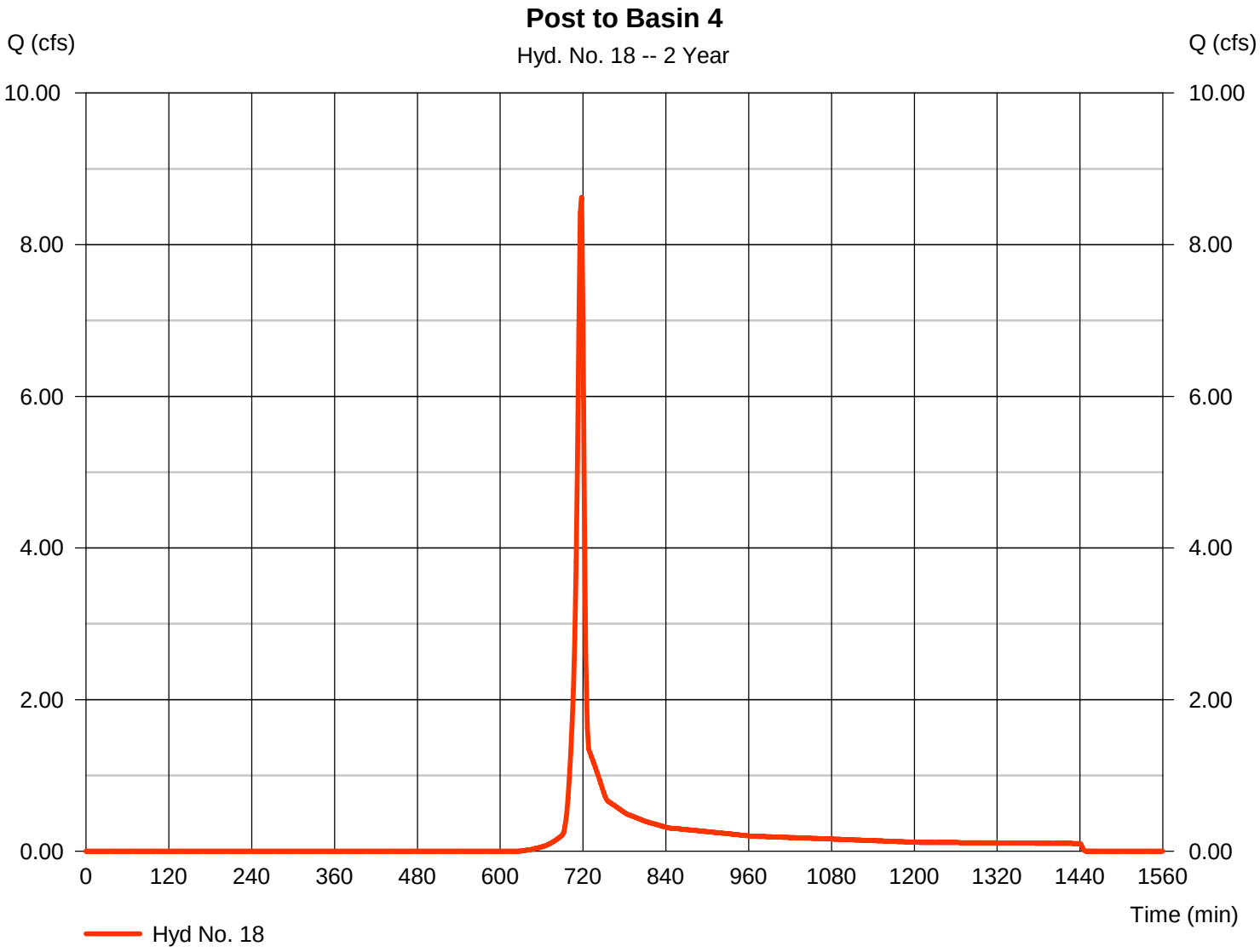
Hydrograph Report

Hyd. No. 18

Post to Basin 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.620 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	17,240 cuft
Drainage area	=	4.420 ac	Curve number	=	75.9*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.910 x 61) + (2.270 x 98) + (3.040 x 78)] / 4.420



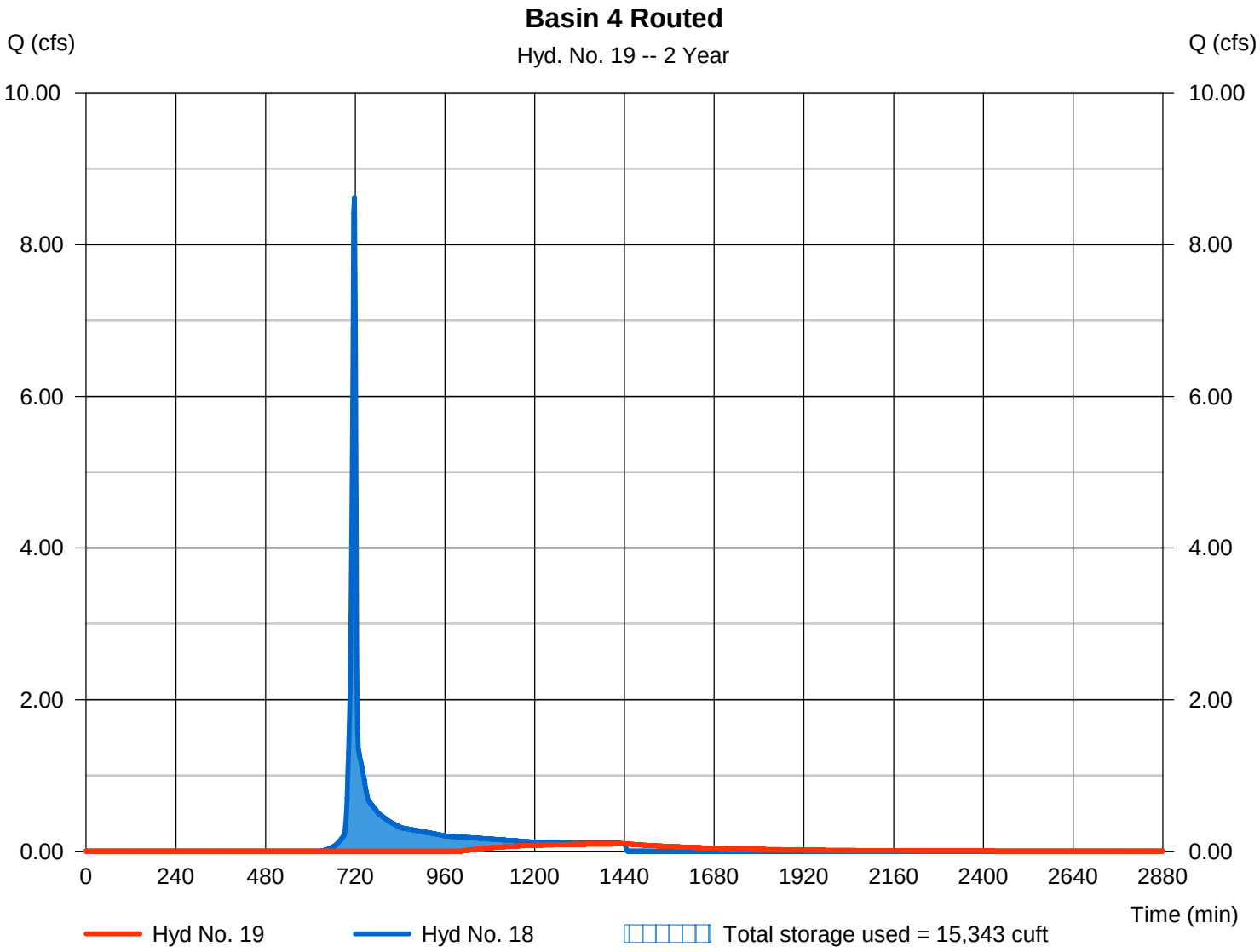
Hydrograph Report

Hyd. No. 19

Basin 4 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.097 cfs
Storm frequency	=	2 yrs	Time to peak	=	1440 min
Time interval	=	2 min	Hyd. volume	=	3,434 cuft
Inflow hyd. No.	=	18 - Post to Basin 4	Max. Elevation	=	346.39 ft
Reservoir name	=	Basin 4	Max. Storage	=	15,343 cuft

Storage Indication method used.



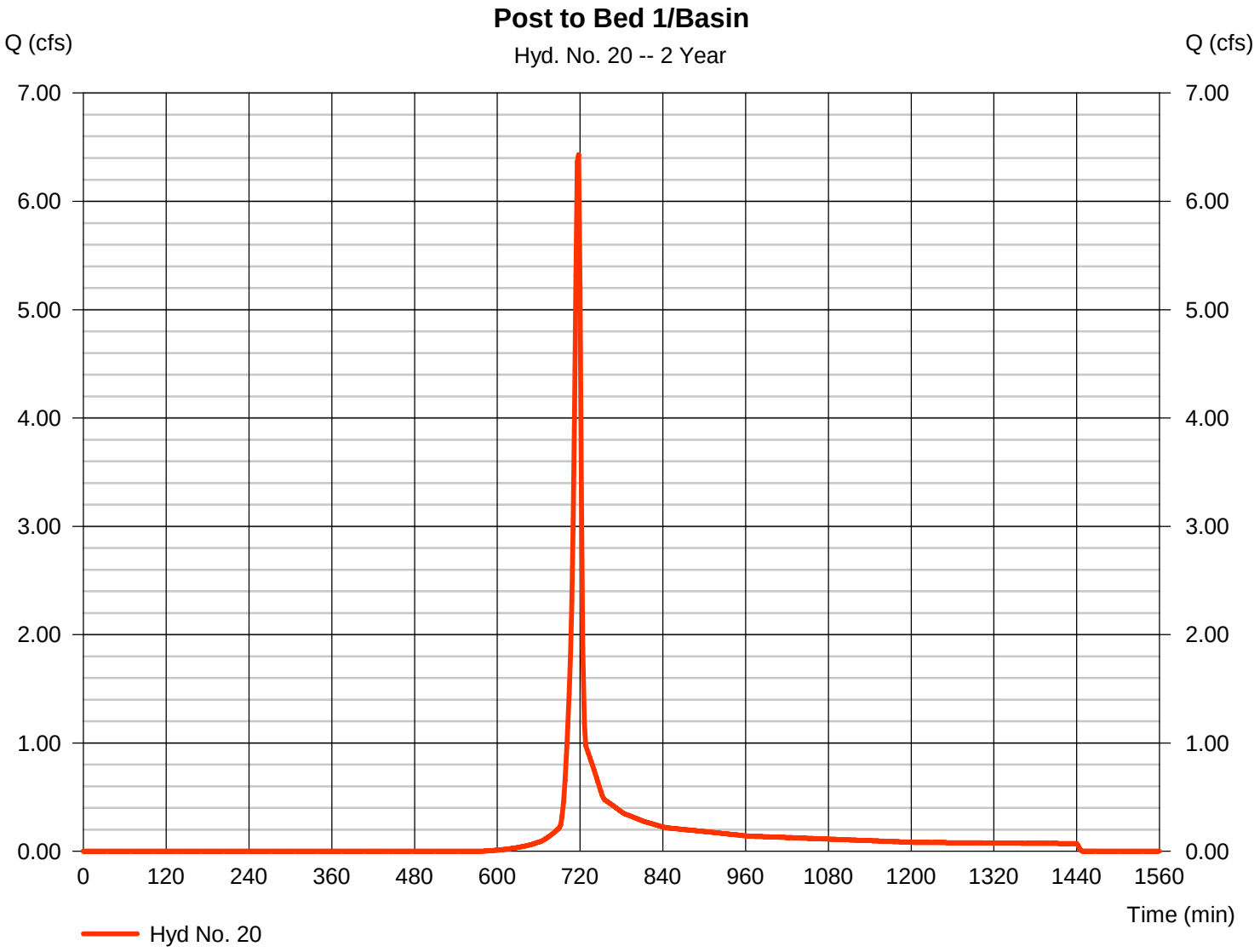
Hydrograph Report

Hyd. No. 20

Post to Bed 1/Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.430 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	12,890 cuft
Drainage area	=	2.820 ac	Curve number	=	79.1*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.910 x 61) + (2.270 x 98) + (3.040 x 78)] / 2.820



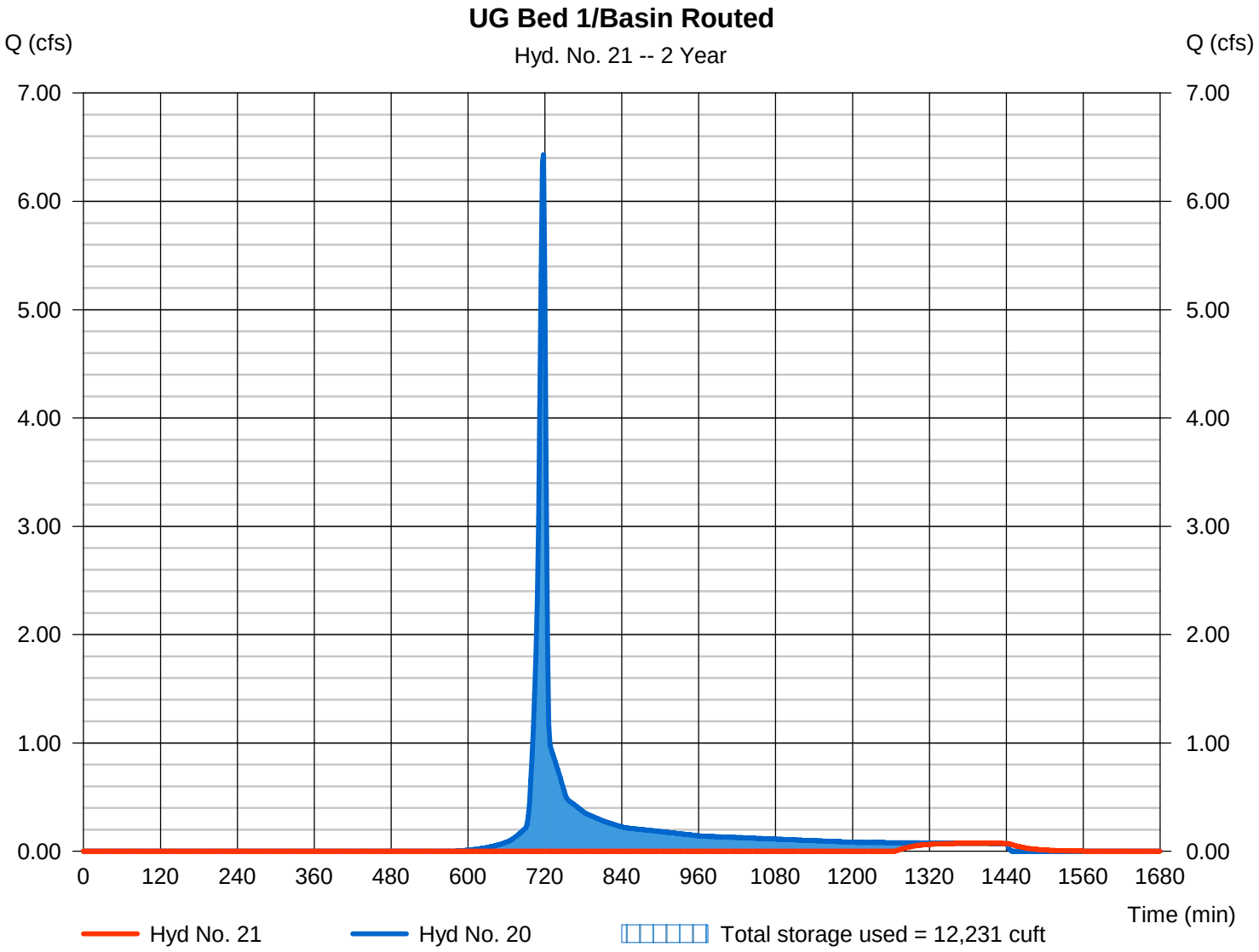
Hydrograph Report

Hyd. No. 21

UG Bed 1/Basin Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.073 cfs
Storm frequency	=	2 yrs	Time to peak	=	1390 min
Time interval	=	2 min	Hyd. volume	=	793 cuft
Inflow hyd. No.	=	20 - Post to Bed 1/Basin	Max. Elevation	=	340.23 ft
Reservoir name	=	UG Bed 1/Basin	Max. Storage	=	12,231 cuft

Storage Indication method used.

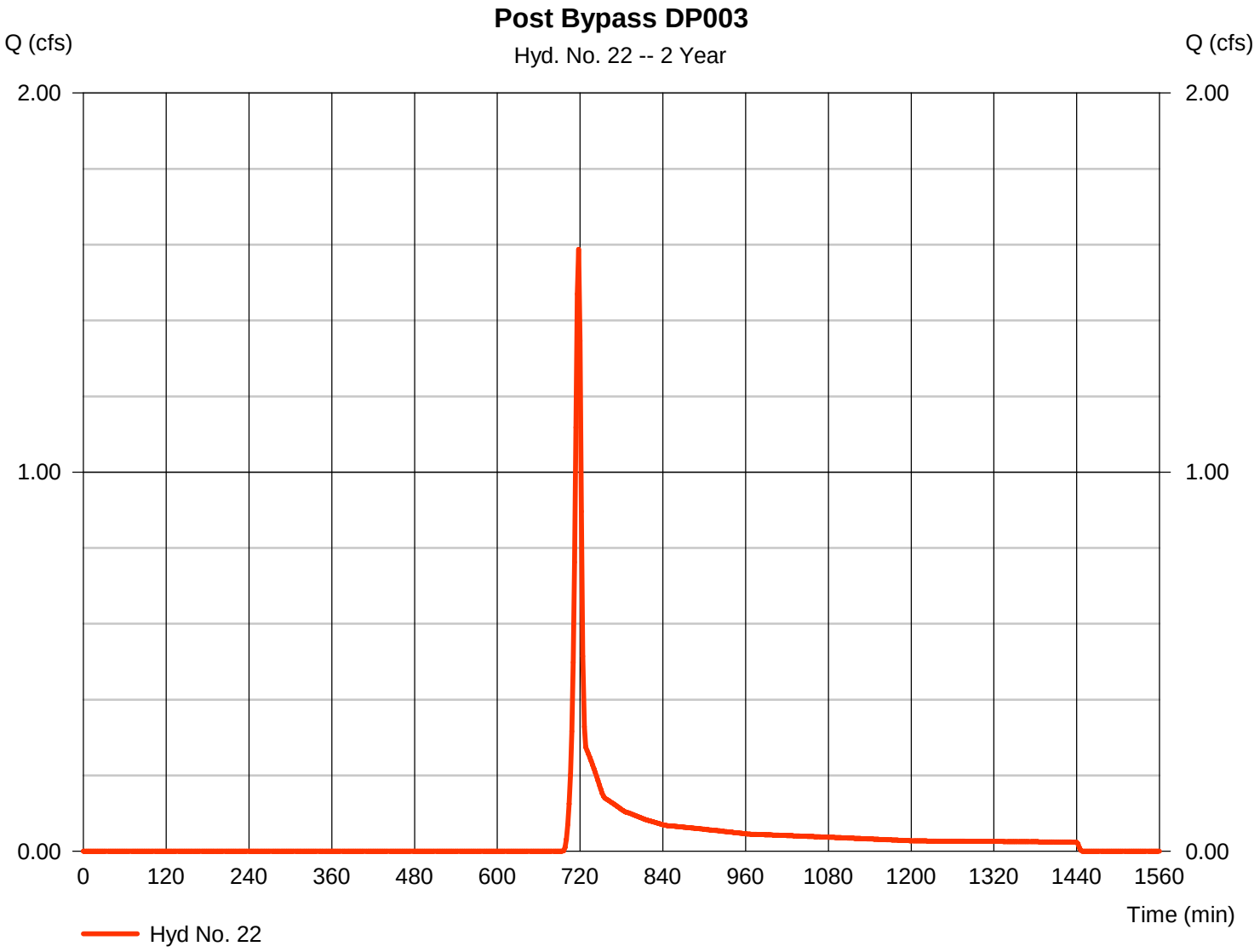


Hydrograph Report

Hyd. No. 22

Post Bypass DP003

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.588 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	3,299 cuft
Drainage area	=	1.340 ac	Curve number	=	67.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

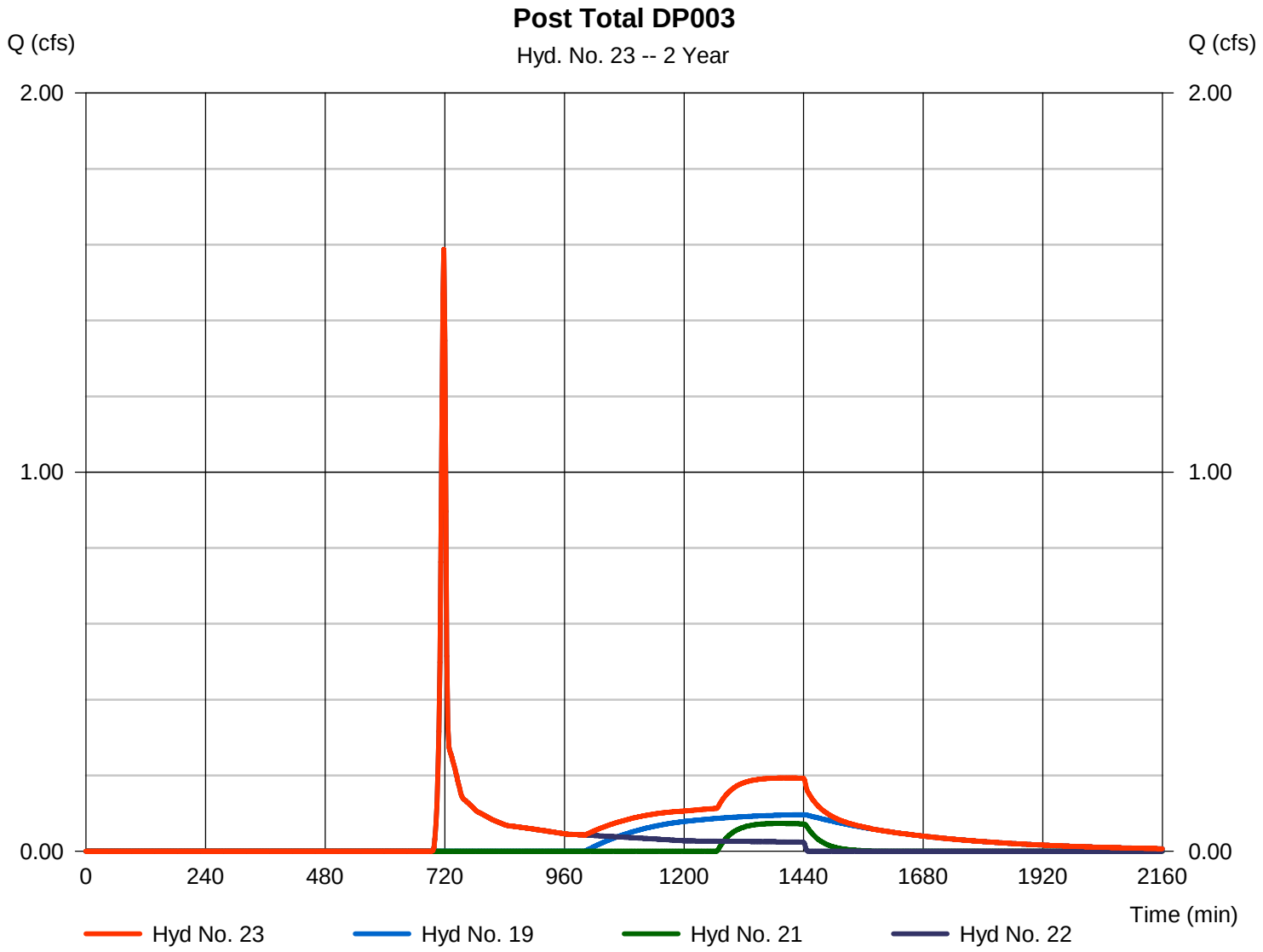


Hydrograph Report

Hyd. No. 23

Post Total DP003

Hydrograph type	=	Combine	Peak discharge	=	1.588 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	7,525 cuft
Inflow hyds.	=	19, 21, 22	Contrib. drain. area	=	1.340 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

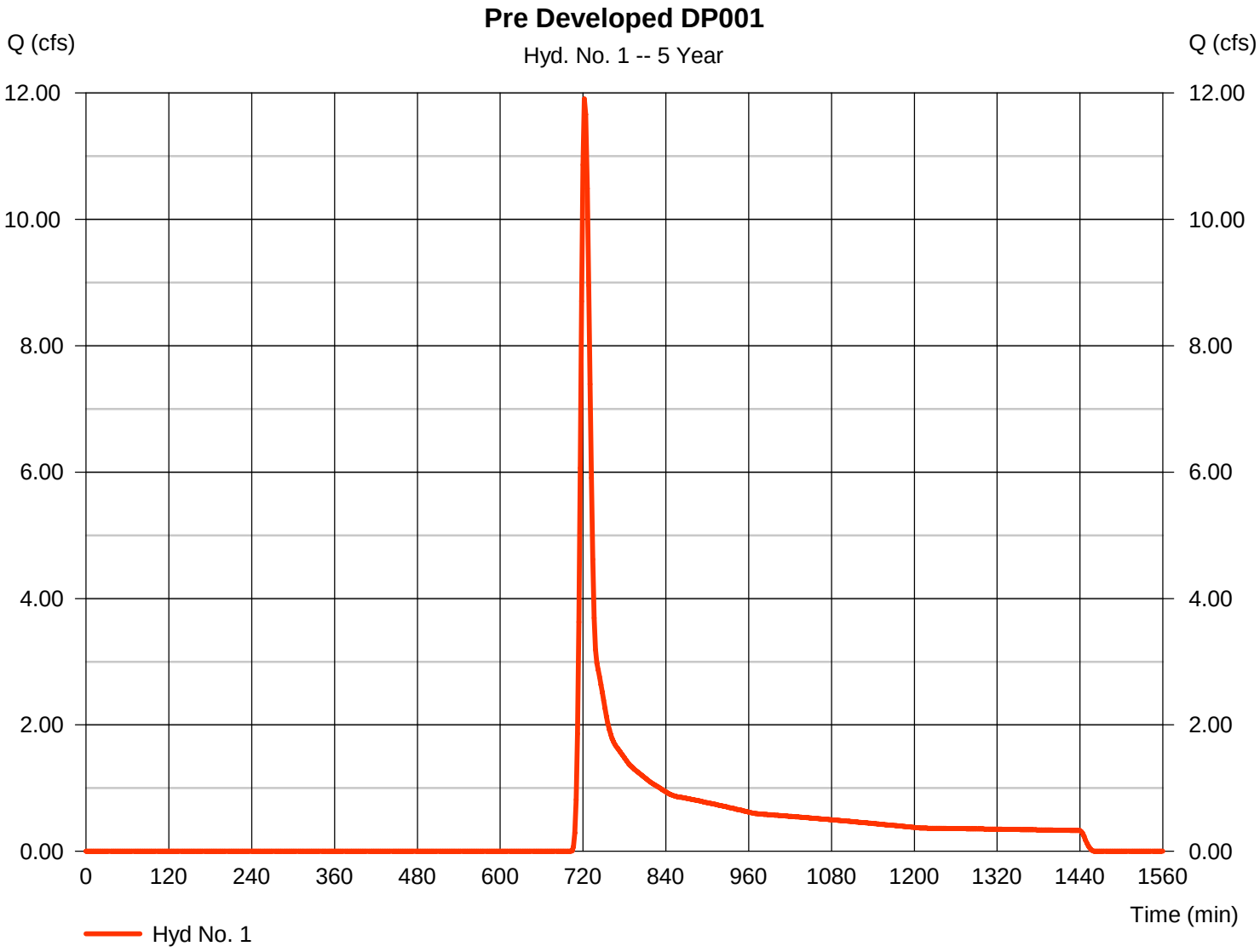
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	11.91	2	722	39,118	------	------	------	Pre Developed DP001
2	SCS Runoff	18.02	2	722	55,435	------	------	------	Pre Developed DP002
3	SCS Runoff	14.55	2	722	39,080	------	------	------	Pre Developed DP003
4	SCS Runoff	1.200	2	718	2,500	------	------	------	Pre Developed DP003 ORA
5	SCS Runoff	30.10	2	718	60,195	------	------	------	Post Basin 3
6	Reservoir	0.593	2	1056	23,011	5	318.31	43,931	Basin 3 Routed
7	SCS Runoff	2.314	2	718	4,767	------	------	------	Post Bypass DP001
8	Combine	2.314	2	718	27,778	6, 7	------	------	Post Total DP001
10	SCS Runoff	28.01	2	718	56,002	------	------	------	Post Basin 1
11	Reservoir	0.510	2	1086	18,513	10	322.71	43,189	Basin 1 Upper Routed
12	Reservoir	0.375	2	1362	12,317	11	304.32	8,514	Basin 1 Lower Routed
13	SCS Runoff	26.44	2	718	53,176	------	------	------	Post Basin 2
14	Reservoir	0.682	2	918	20,822	13	309.11	36,790	Basin 2 Routed
15	SCS Runoff	2.121	2	718	4,472	------	------	------	Post Bypass DP002
16	Combine	2.121	2	718	37,611	12, 14, 15	------	------	Post Total DP002
18	SCS Runoff	13.42	2	718	26,965	------	------	------	Post to Basin 4
19	Reservoir	0.462	2	840	13,159	18	346.58	16,833	Basin 4 Routed
20	SCS Runoff	9.677	2	716	19,544	------	------	------	Post to Bed 1/Basin
21	Reservoir	0.351	2	828	7,446	20	340.35	12,744	UG Bed 1/Basin Routed
22	SCS Runoff	2.821	2	718	5,670	------	------	------	Post Bypass DP003
23	Combine	2.821	2	718	26,276	19, 21, 22	------	------	Post Total DP003

Hydrograph Report

Hyd. No. 1

Pre Developed DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.91 cfs
Storm frequency	=	5 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	39,118 cuft
Drainage area	=	15.430 ac	Curve number	=	57.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

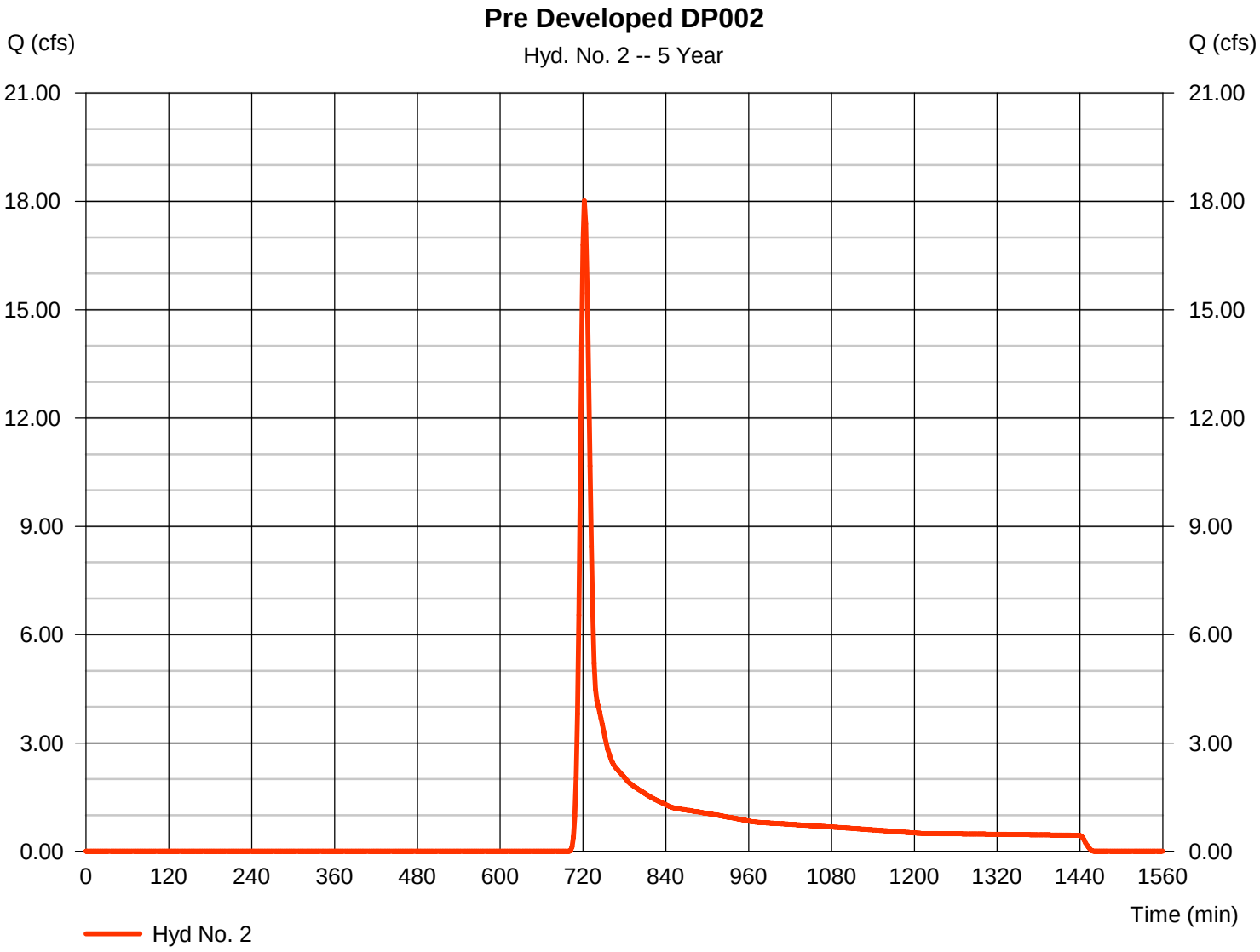


Hydrograph Report

Hyd. No. 2

Pre Developed DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	18.02 cfs
Storm frequency	=	5 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	55,435 cuft
Drainage area	=	19.210 ac	Curve number	=	59.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

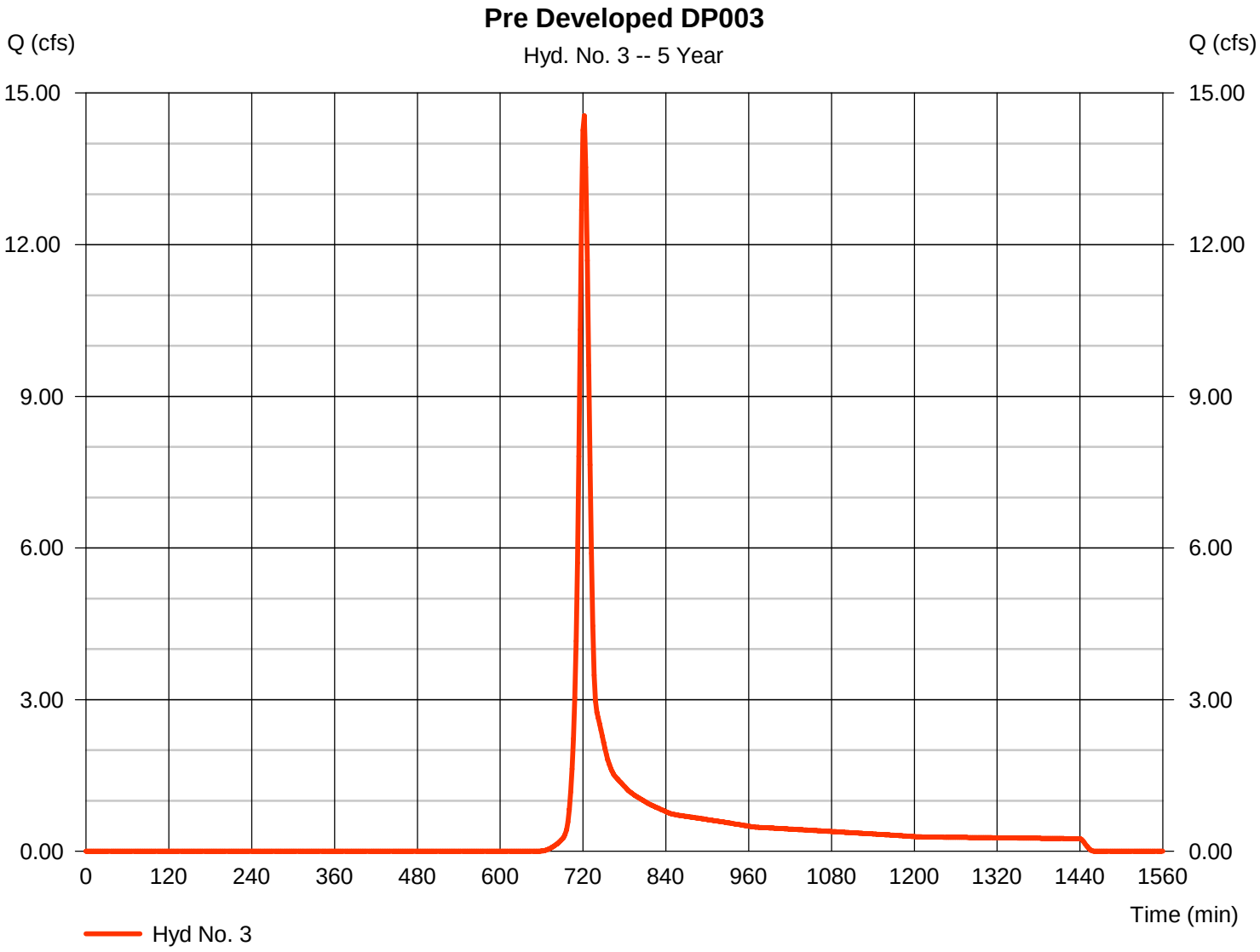


Hydrograph Report

Hyd. No. 3

Pre Developed DP003

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.55 cfs
Storm frequency	=	5 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	39,080 cuft
Drainage area	=	8.190 ac	Curve number	=	68.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

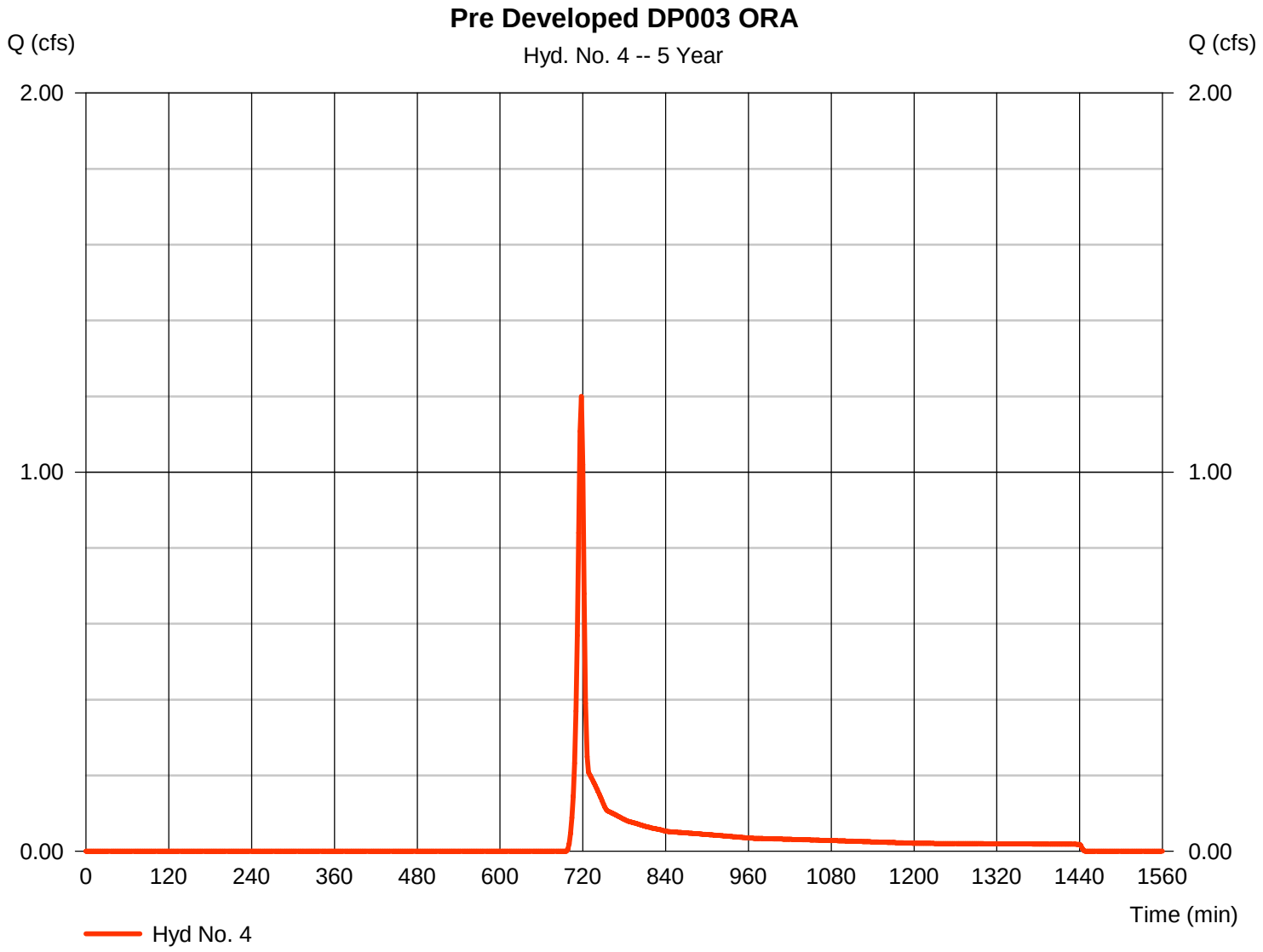


Hydrograph Report

Hyd. No. 4

Pre Developed DP003 ORA

Hydrograph type	= SCS Runoff	Peak discharge	= 1.200 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 2,500 cuft
Drainage area	= 0.810 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.08 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

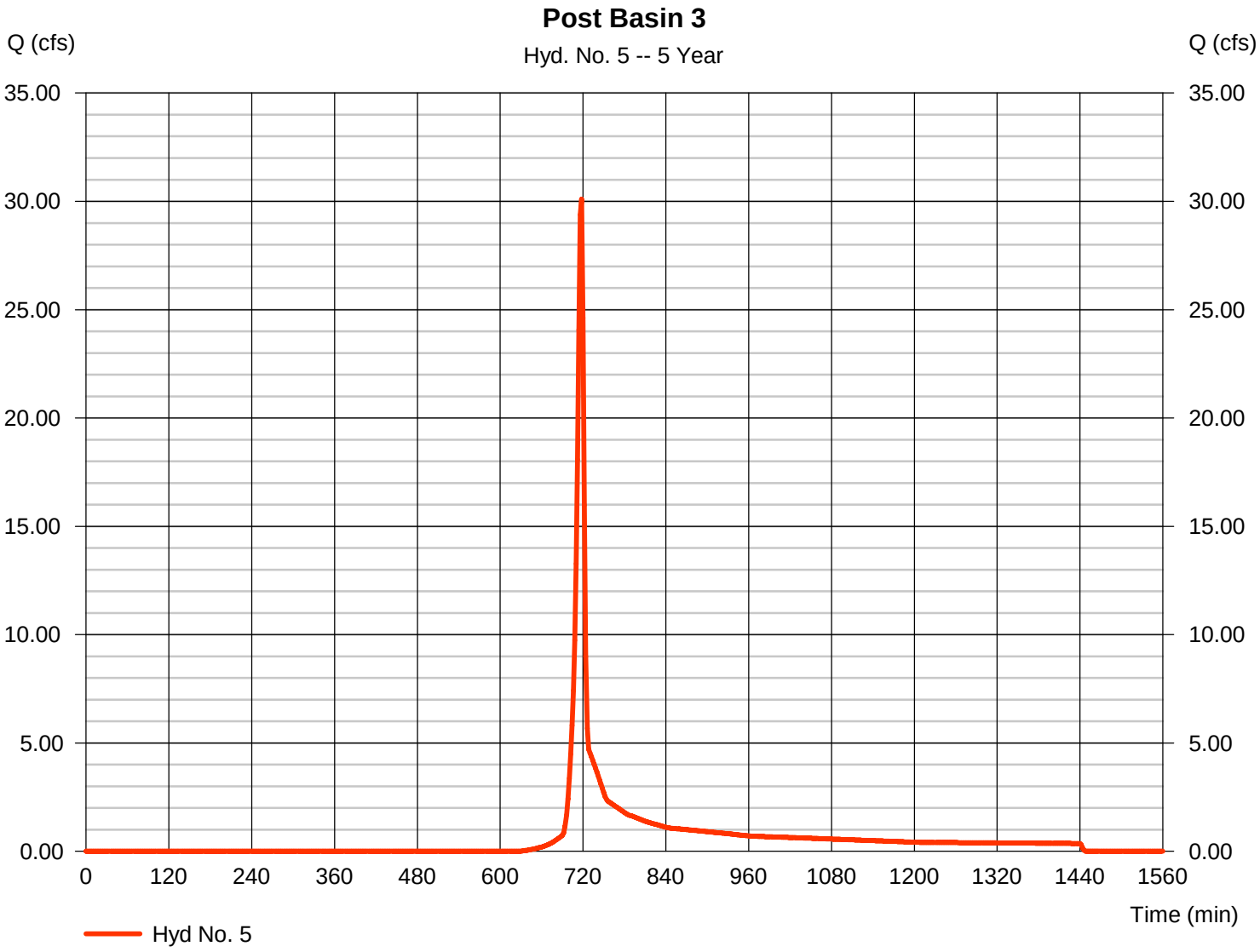


Hydrograph Report

Hyd. No. 5

Post Basin 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	30.10 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	60,195 cuft
Drainage area	=	12.150 ac	Curve number	=	71.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



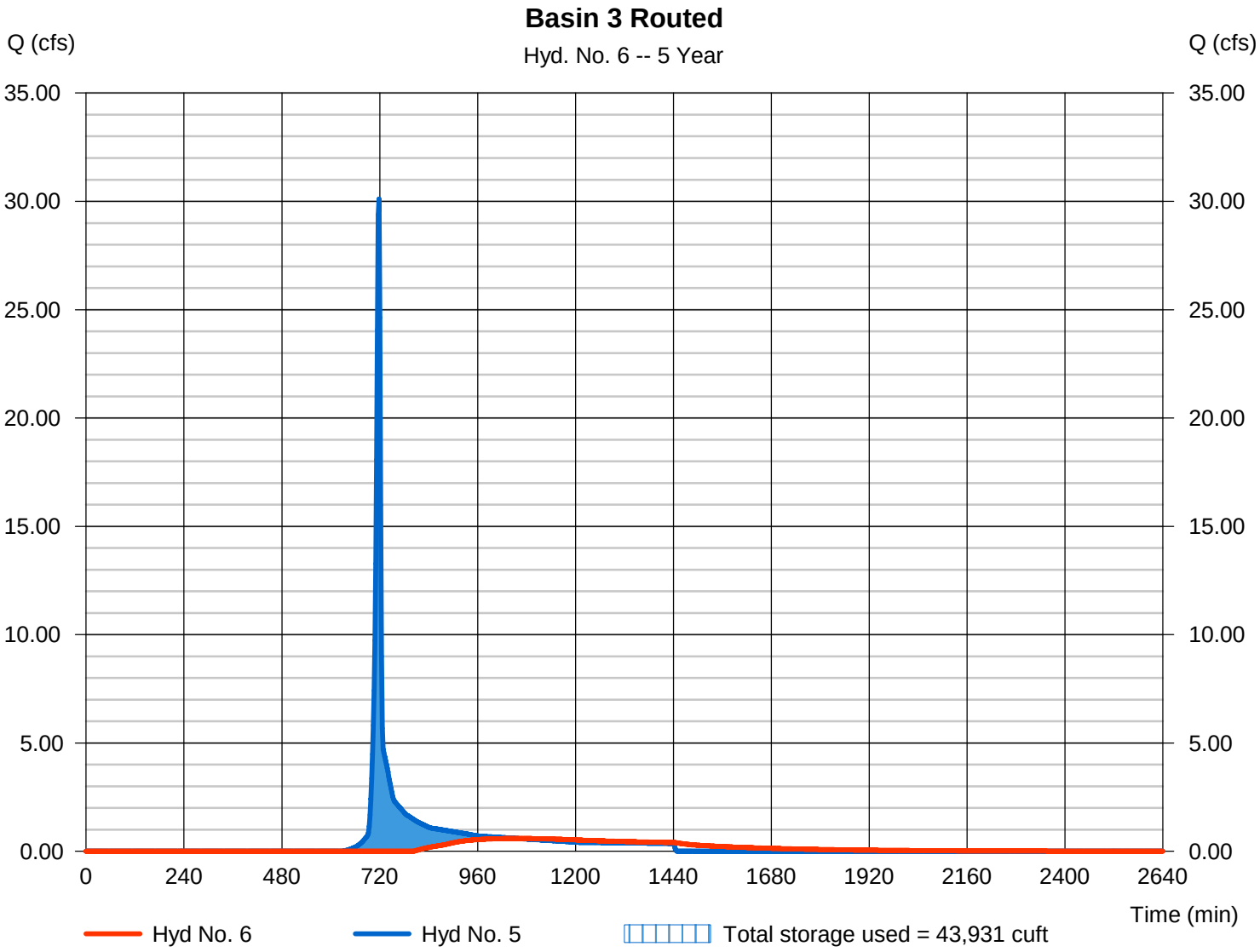
Hydrograph Report

Hyd. No. 6

Basin 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.593 cfs
Storm frequency	=	5 yrs	Time to peak	=	1056 min
Time interval	=	2 min	Hyd. volume	=	23,011 cuft
Inflow hyd. No.	=	5 - Post Basin 3	Max. Elevation	=	318.31 ft
Reservoir name	=	Basin 3	Max. Storage	=	43,931 cuft

Storage Indication method used.

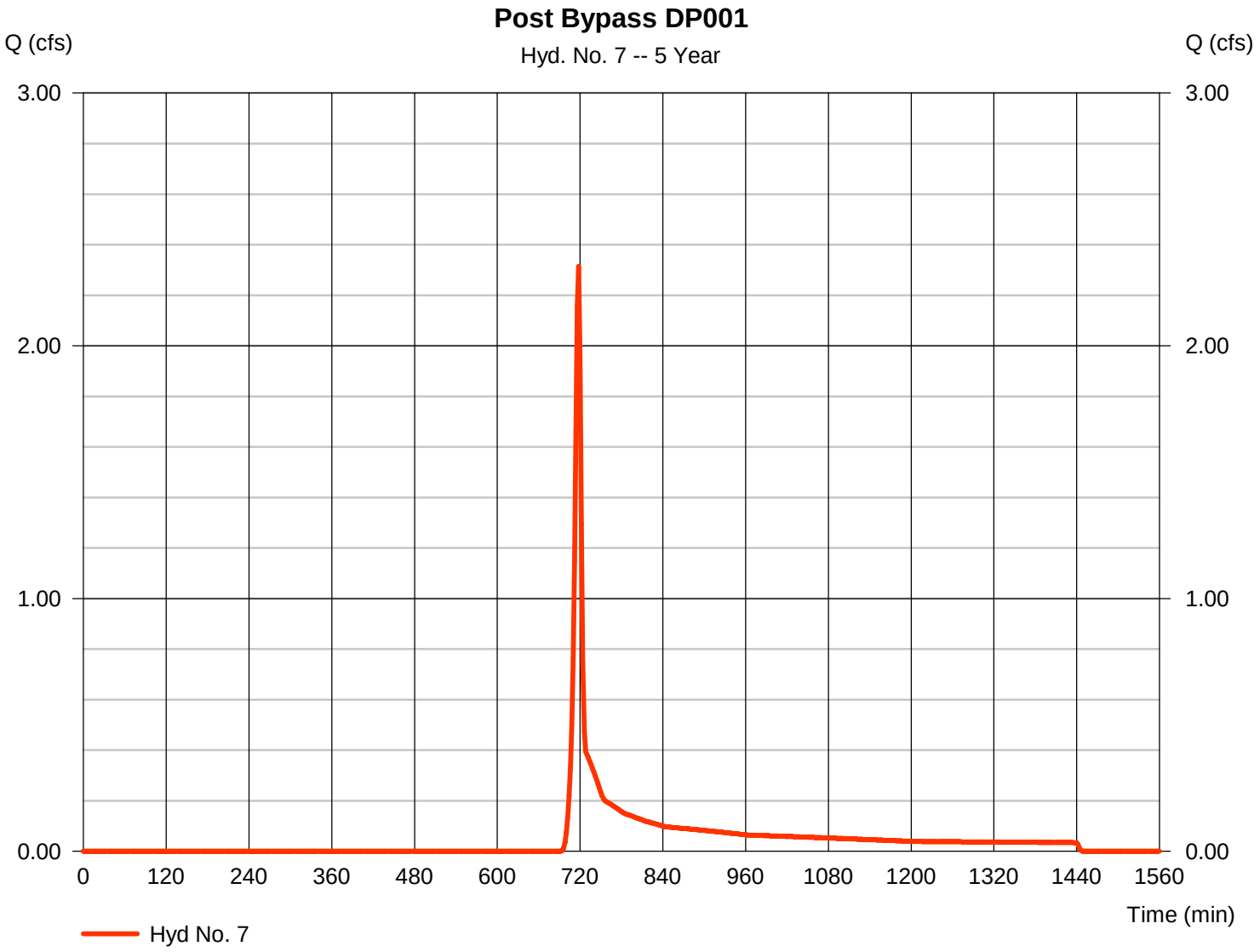


Hydrograph Report

Hyd. No. 7

Post Bypass DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.314 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	4,767 cuft
Drainage area	=	1.440 ac	Curve number	=	63.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

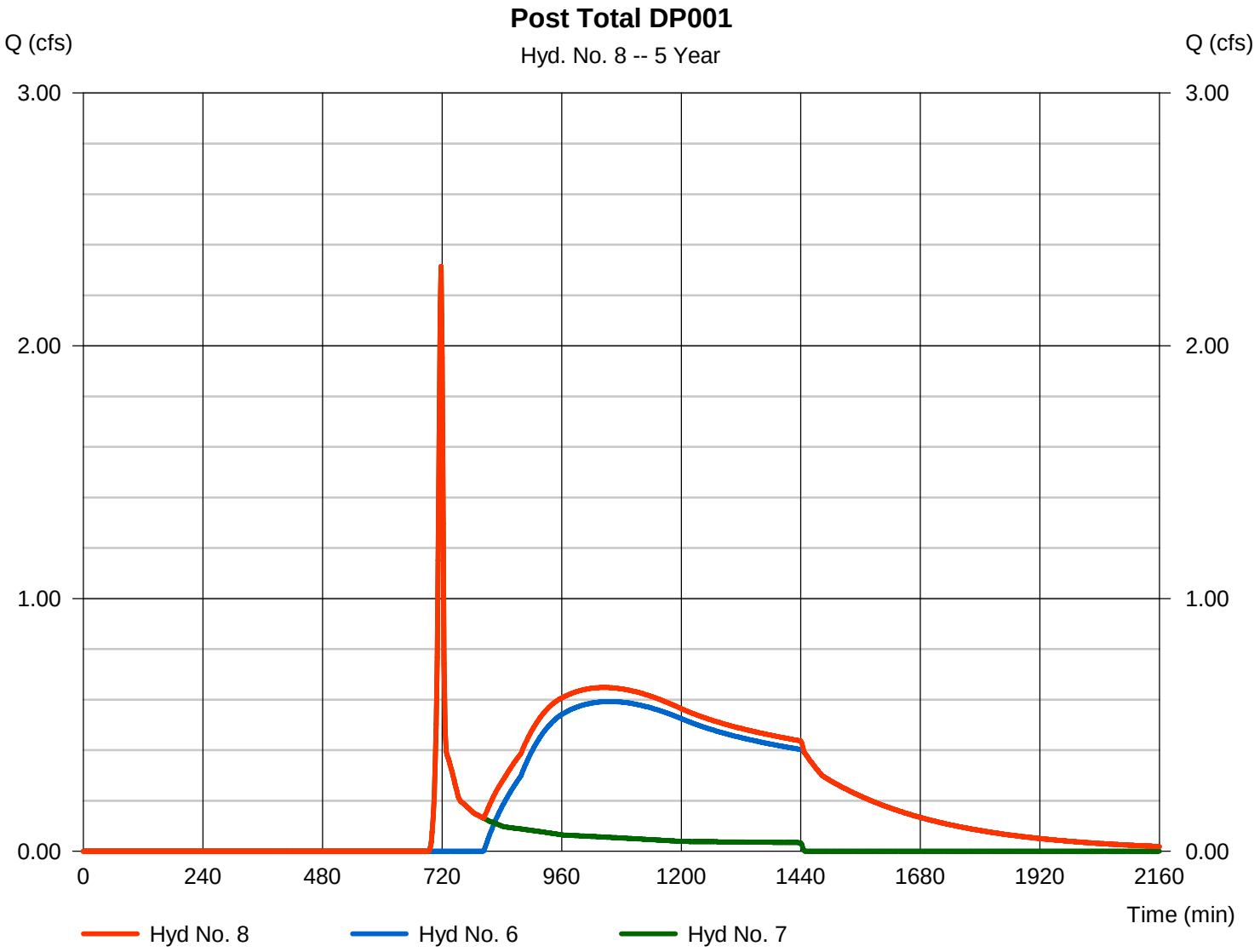


Hydrograph Report

Hyd. No. 8

Post Total DP001

Hydrograph type	= Combine	Peak discharge	= 2.314 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 27,778 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.440 ac

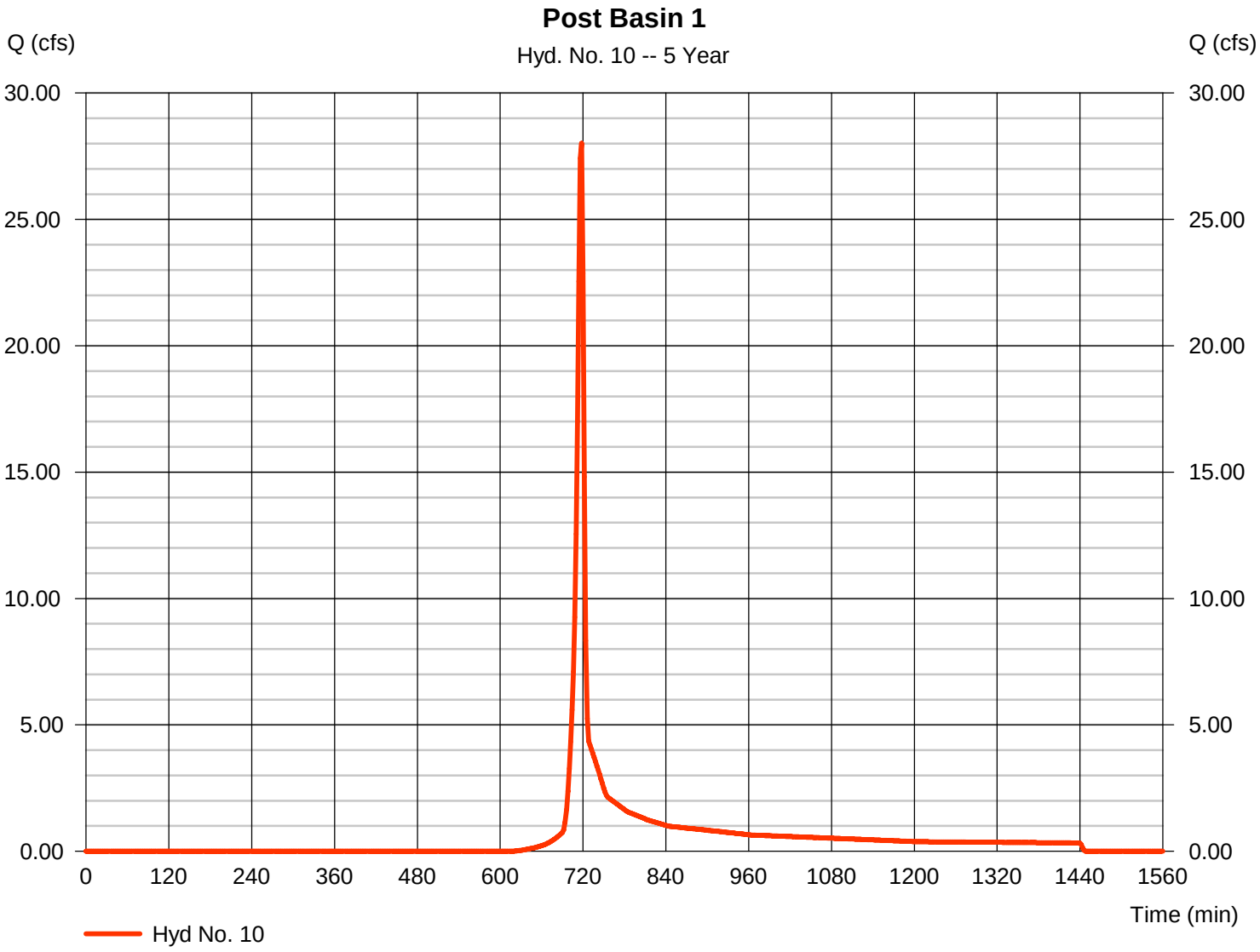


Hydrograph Report

Hyd. No. 10

Post Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.01 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	56,002 cuft
Drainage area	=	10.950 ac	Curve number	=	71.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



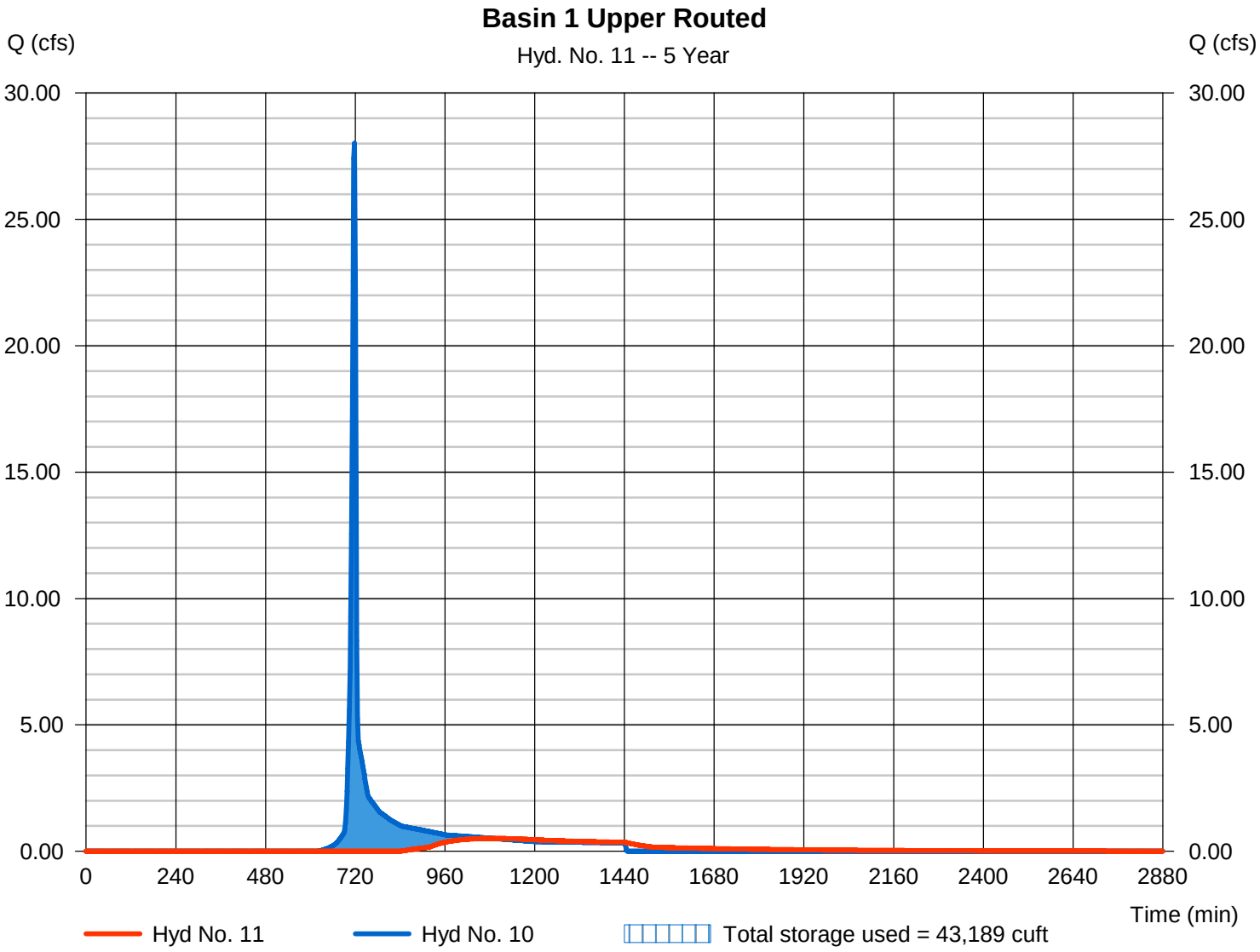
Hydrograph Report

Hyd. No. 11

Basin 1 Upper Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.510 cfs
Storm frequency	=	5 yrs	Time to peak	=	1086 min
Time interval	=	2 min	Hyd. volume	=	18,513 cuft
Inflow hyd. No.	=	10 - Post Basin 1	Max. Elevation	=	322.71 ft
Reservoir name	=	Basin 1 Upper	Max. Storage	=	43,189 cuft

Storage Indication method used.



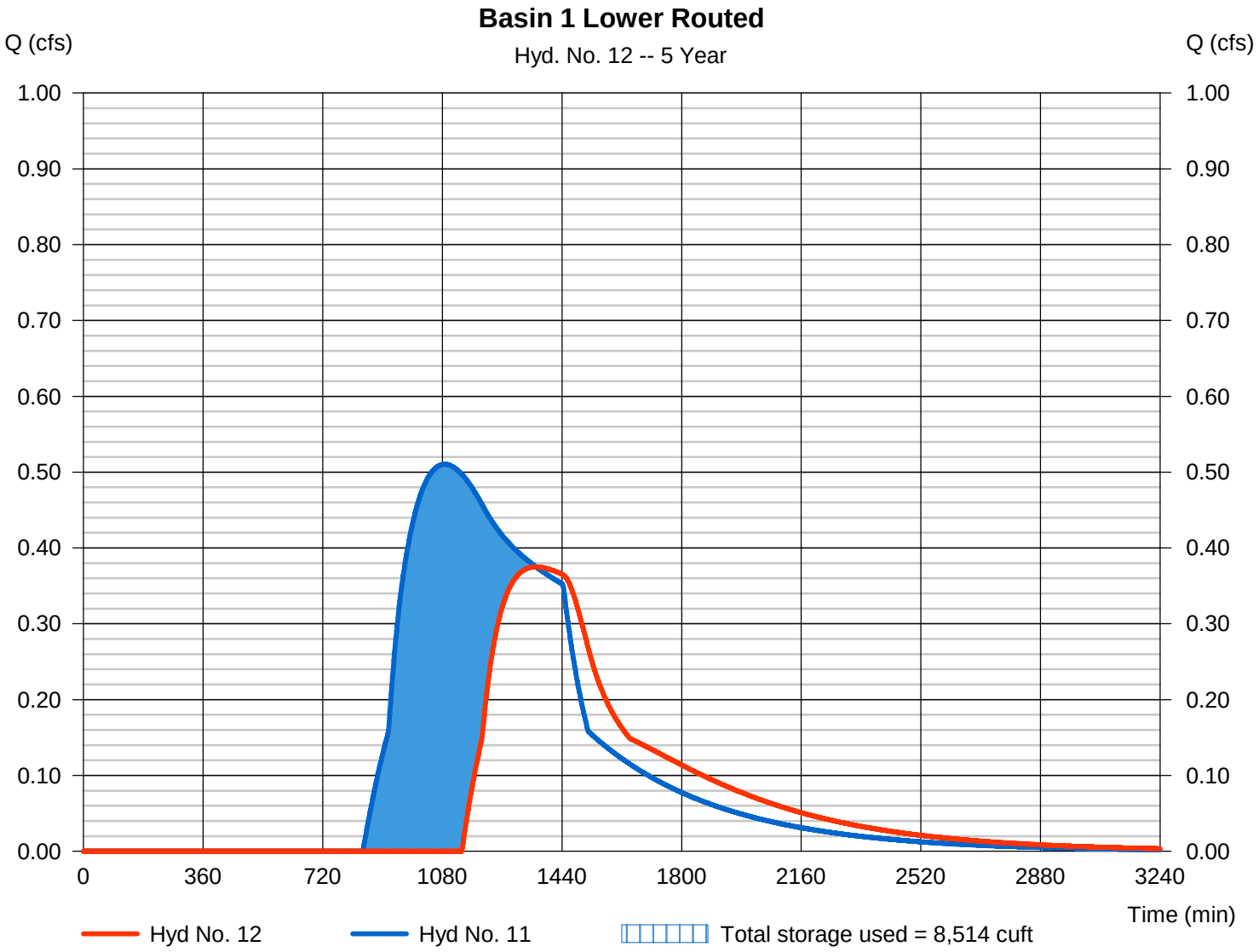
Hydrograph Report

Hyd. No. 12

Basin 1 Lower Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.375 cfs
Storm frequency	=	5 yrs	Time to peak	=	1362 min
Time interval	=	2 min	Hyd. volume	=	12,317 cuft
Inflow hyd. No.	=	11 - Basin 1 Upper Routed	Max. Elevation	=	304.32 ft
Reservoir name	=	Basin 1 Lower	Max. Storage	=	8,514 cuft

Storage Indication method used.

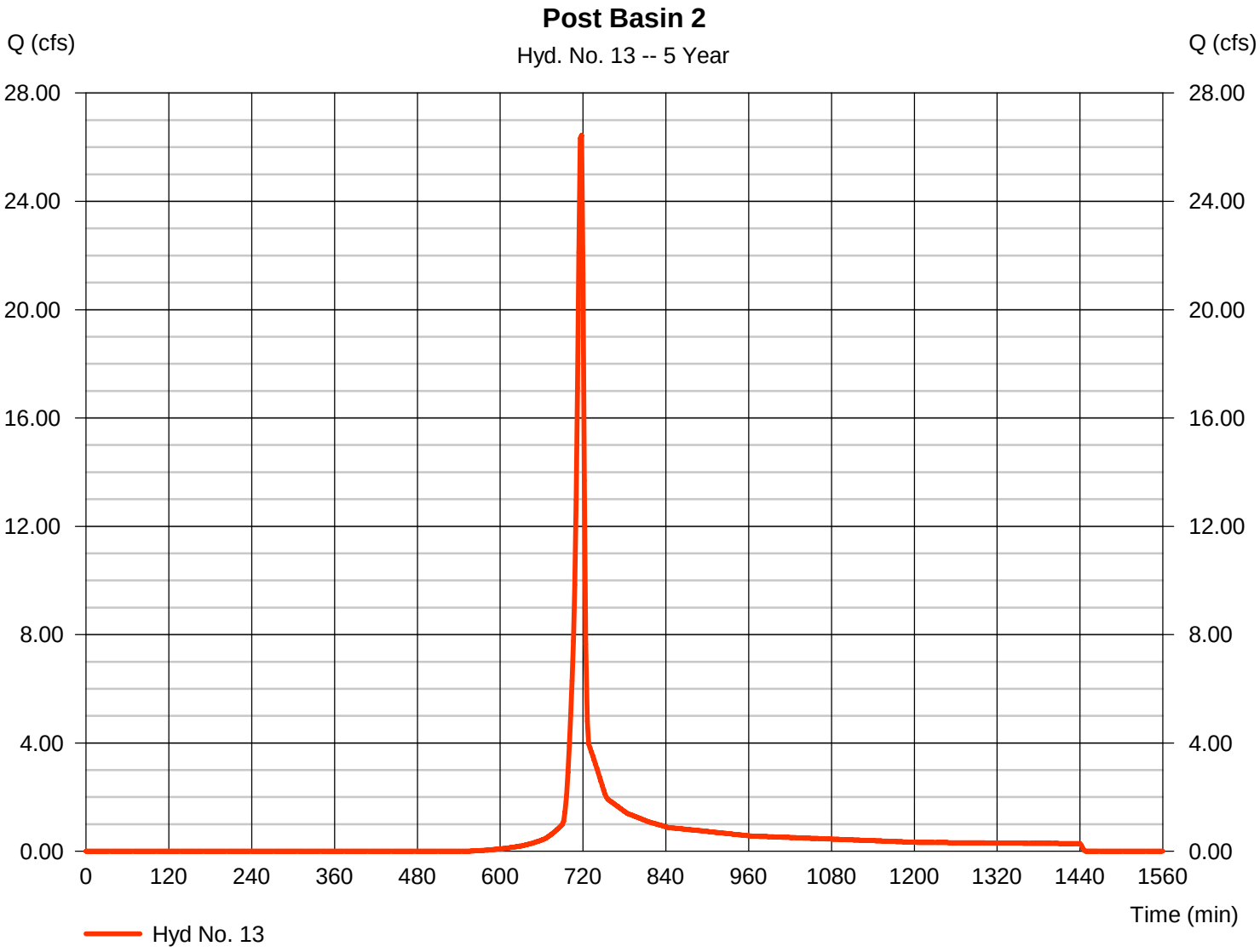


Hydrograph Report

Hyd. No. 13

Post Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	26.44 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	53,176 cuft
Drainage area	=	8.540 ac	Curve number	=	76.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



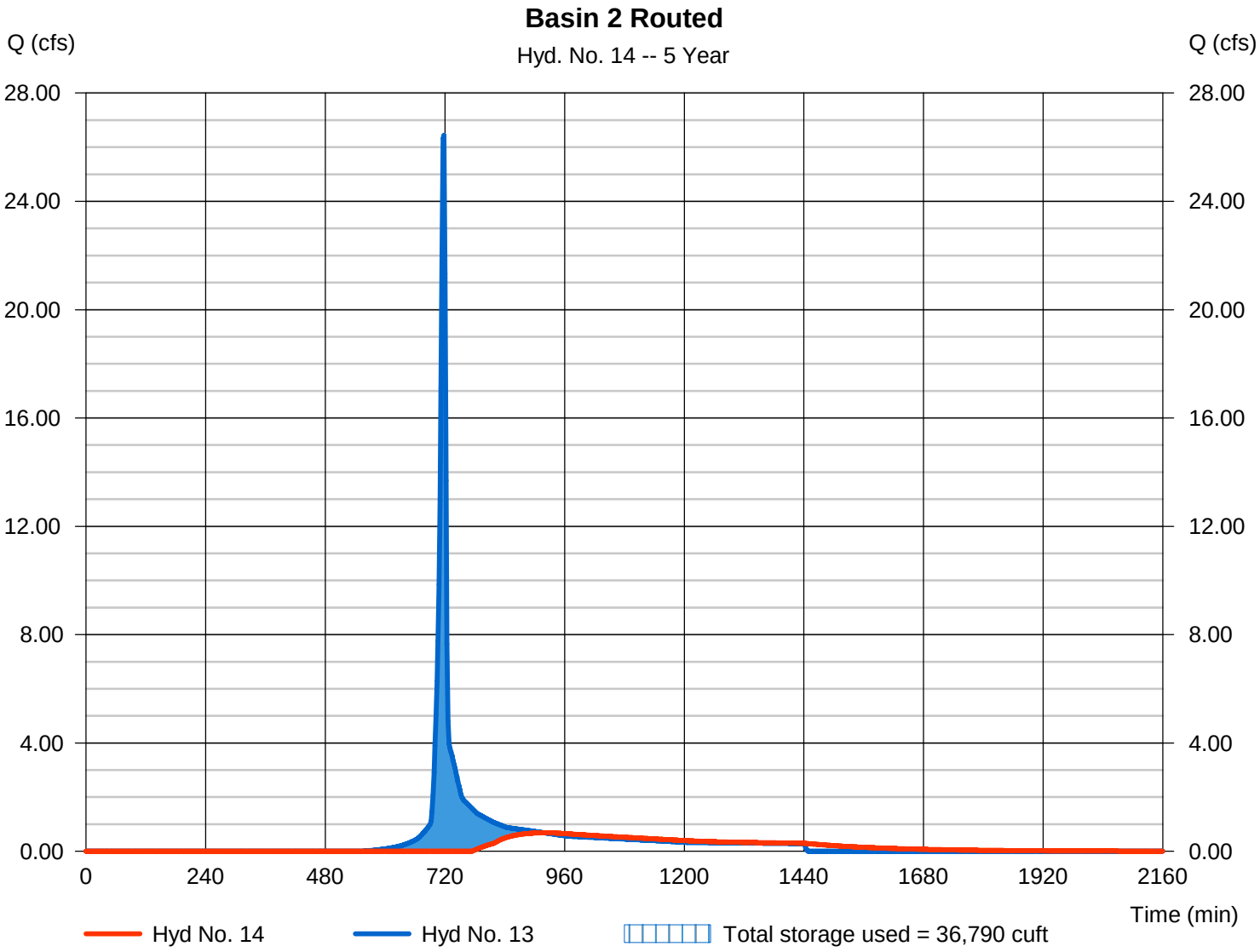
Hydrograph Report

Hyd. No. 14

Basin 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.682 cfs
Storm frequency	=	5 yrs	Time to peak	=	918 min
Time interval	=	2 min	Hyd. volume	=	20,822 cuft
Inflow hyd. No.	=	13 - Post Basin 2	Max. Elevation	=	309.11 ft
Reservoir name	=	Basin 2	Max. Storage	=	36,790 cuft

Storage Indication method used.

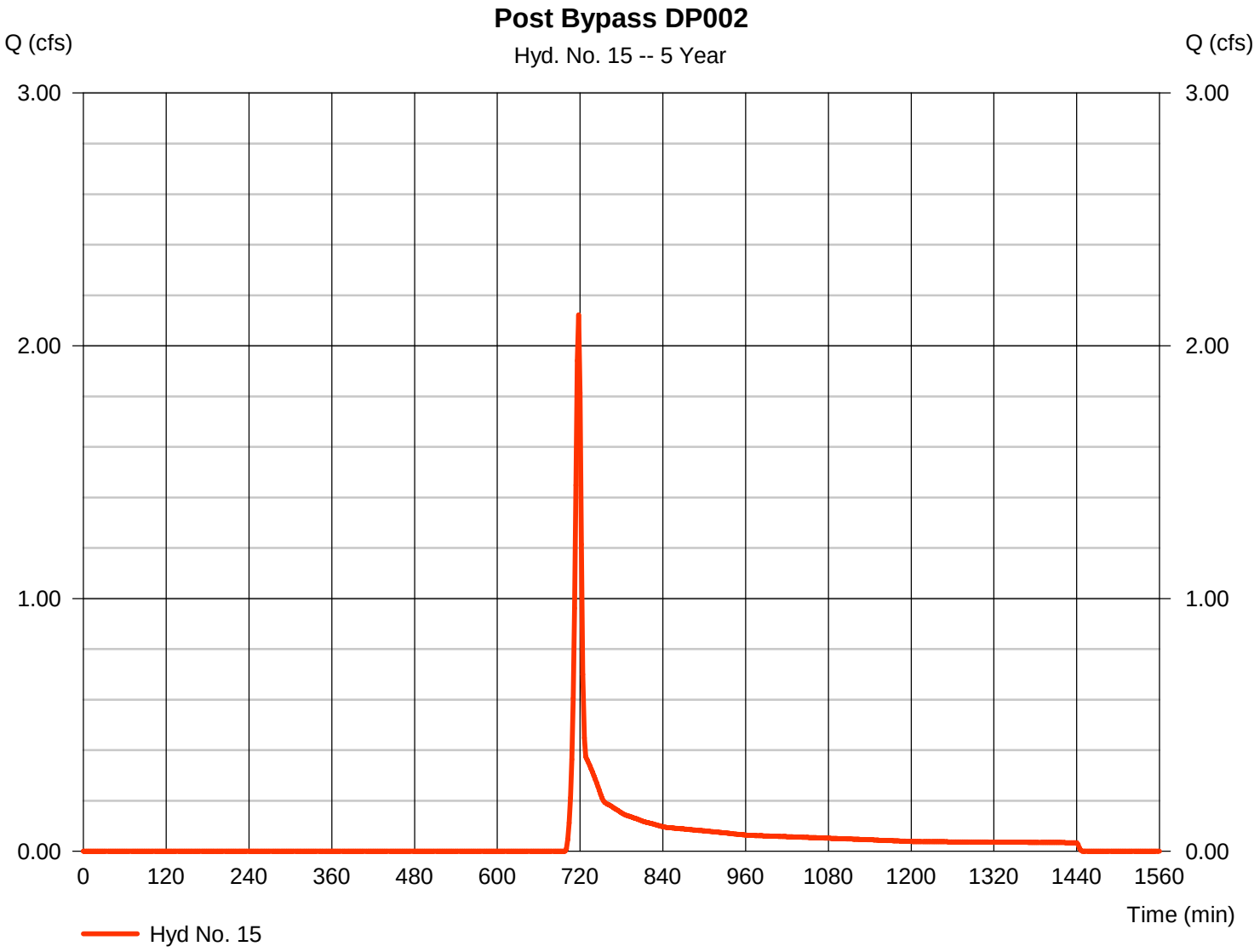


Hydrograph Report

Hyd. No. 15

Post Bypass DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.121 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	4,472 cuft
Drainage area	=	1.540 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

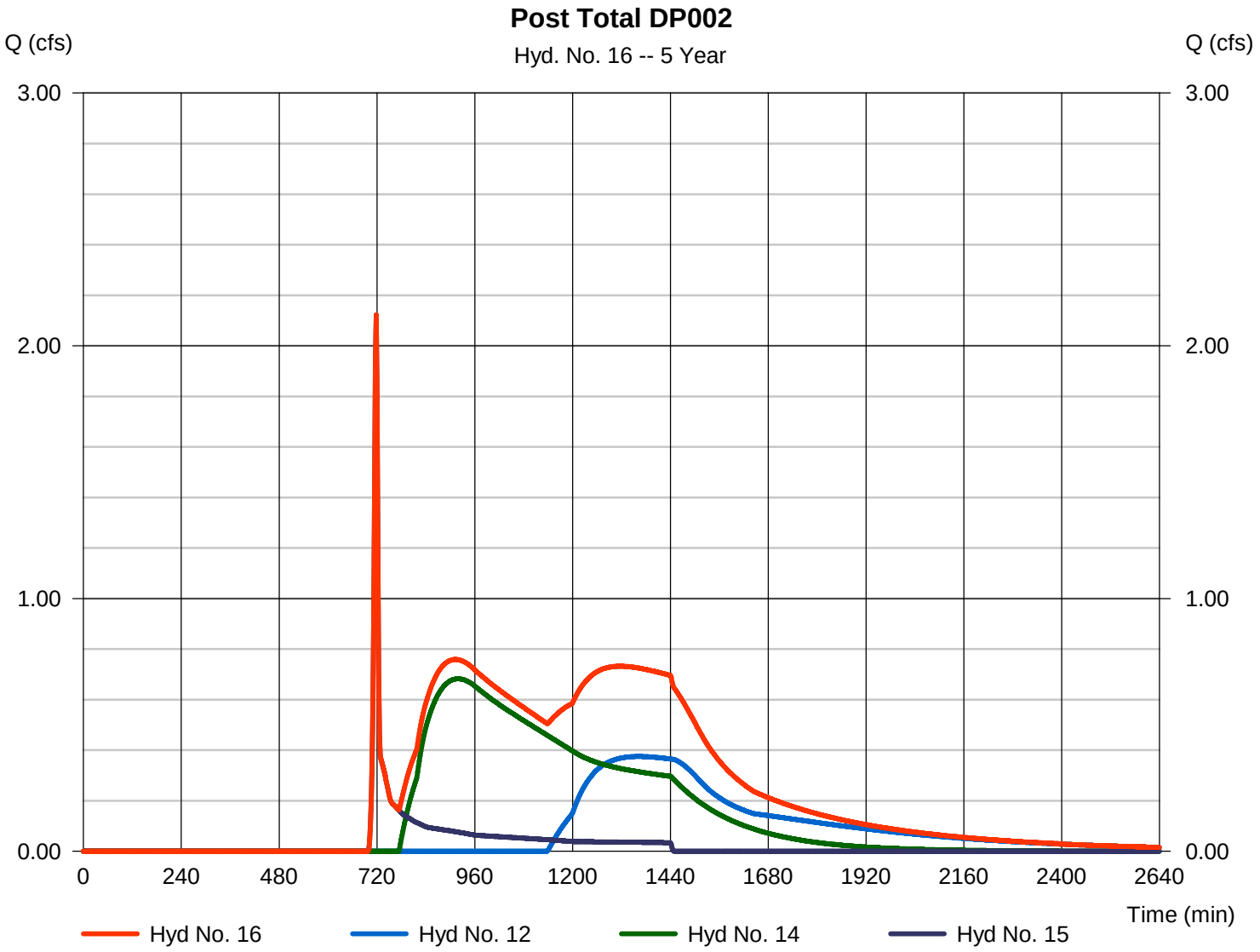


Hydrograph Report

Hyd. No. 16

Post Total DP002

Hydrograph type	= Combine	Peak discharge	= 2.121 cfs
Storm frequency	= 5 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 37,611 cuft
Inflow hyds.	= 12, 14, 15	Contrib. drain. area	= 1.540 ac



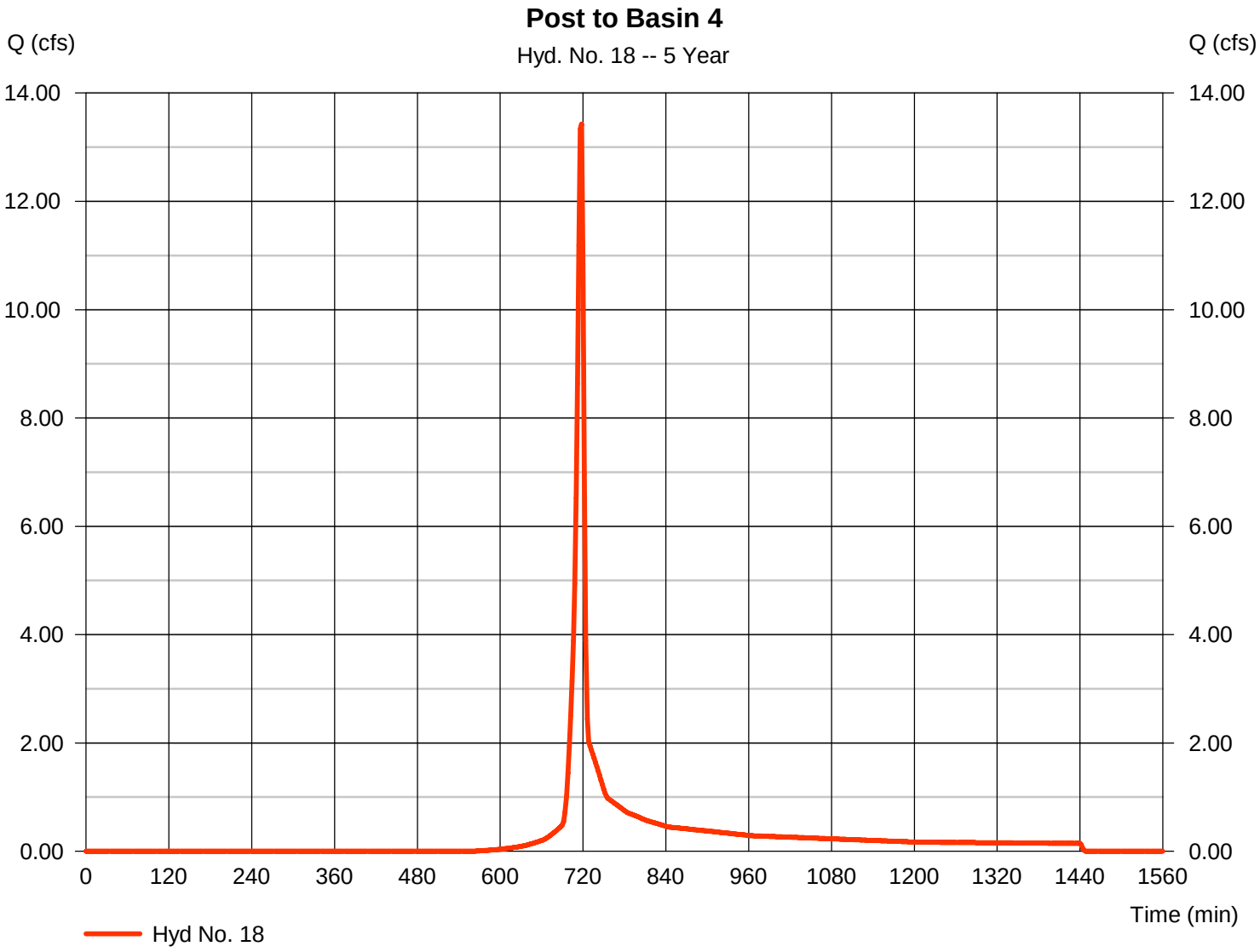
Hydrograph Report

Hyd. No. 18

Post to Basin 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.42 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	26,965 cuft
Drainage area	=	4.420 ac	Curve number	=	75.9*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.910 x 61) + (2.270 x 98) + (3.040 x 78)] / 4.420



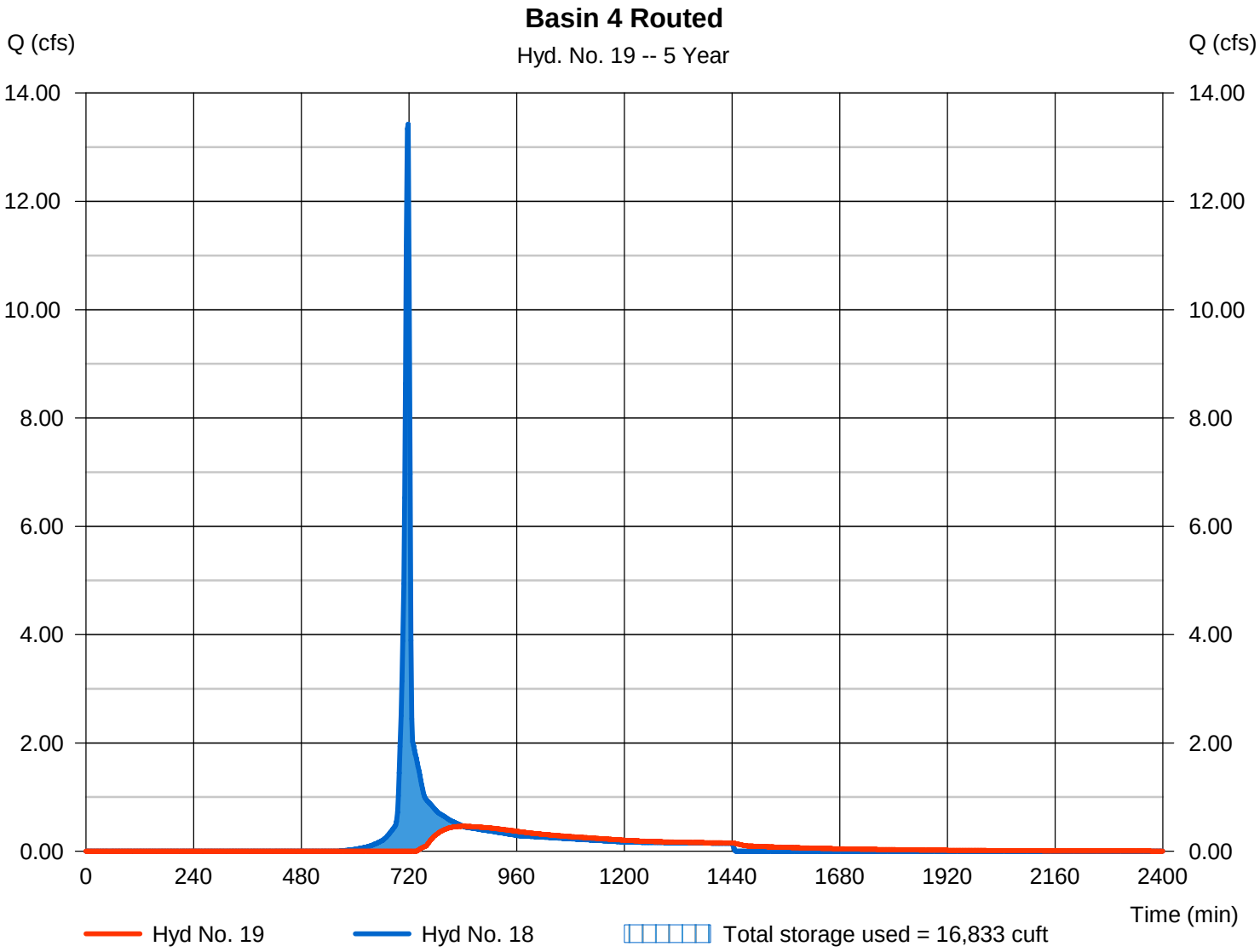
Hydrograph Report

Hyd. No. 19

Basin 4 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.462 cfs
Storm frequency	=	5 yrs	Time to peak	=	840 min
Time interval	=	2 min	Hyd. volume	=	13,159 cuft
Inflow hyd. No.	=	18 - Post to Basin 4	Max. Elevation	=	346.58 ft
Reservoir name	=	Basin 4	Max. Storage	=	16,833 cuft

Storage Indication method used.



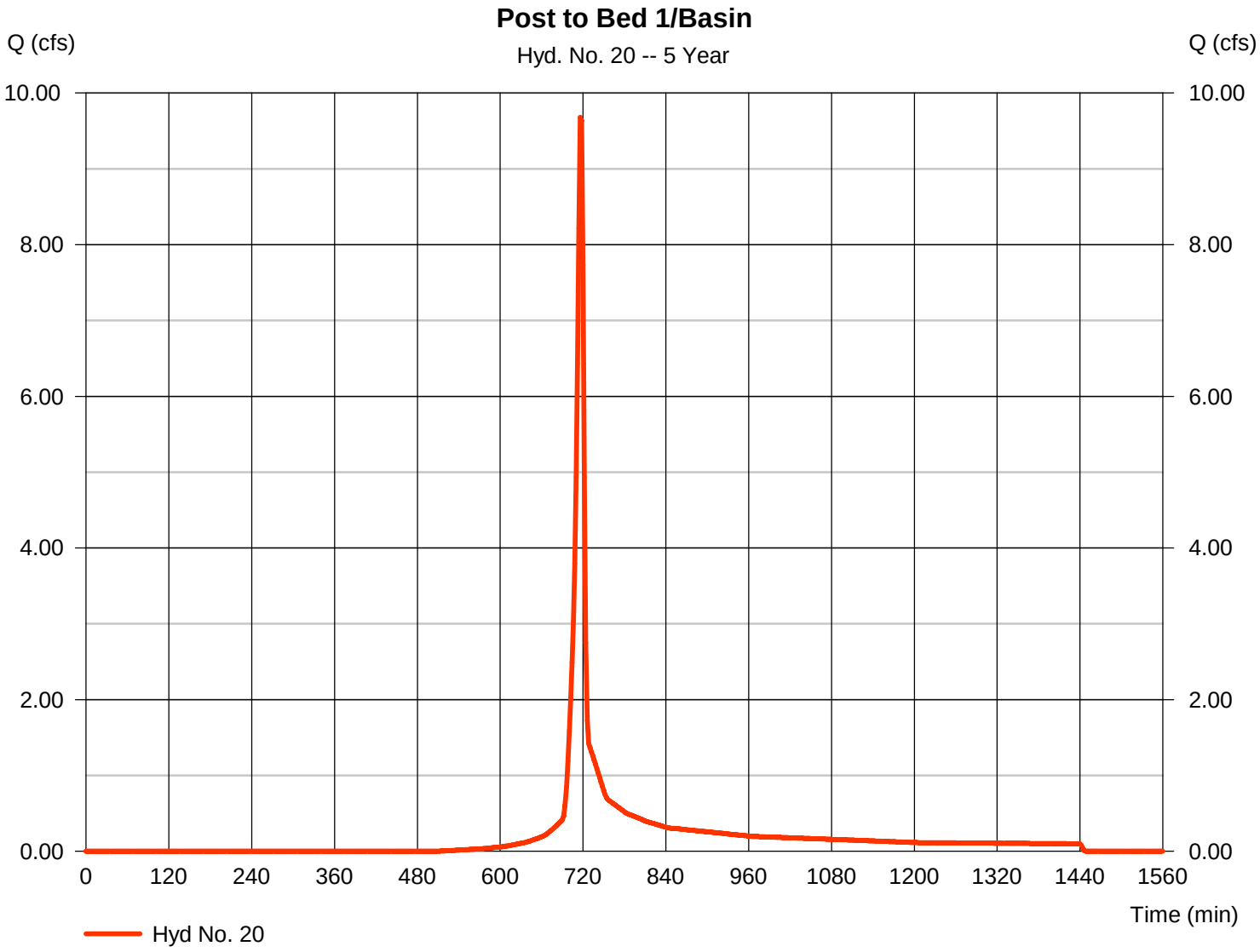
Hydrograph Report

Hyd. No. 20

Post to Bed 1/Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	9.677 cfs
Storm frequency	=	5 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	19,544 cuft
Drainage area	=	2.820 ac	Curve number	=	79.1*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.910 x 61) + (2.270 x 98) + (3.040 x 78)] / 2.820



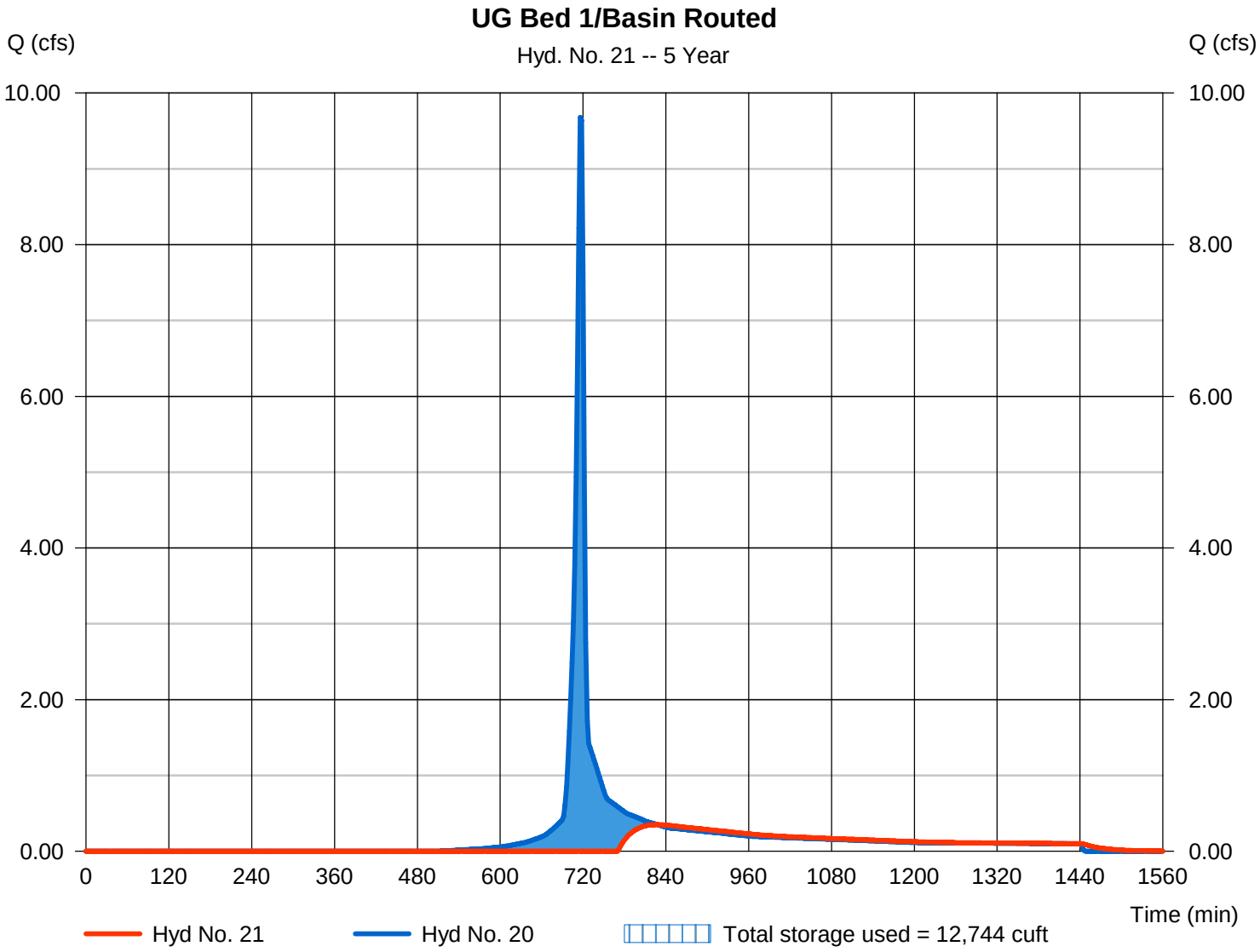
Hydrograph Report

Hyd. No. 21

UG Bed 1/Basin Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.351 cfs
Storm frequency	=	5 yrs	Time to peak	=	828 min
Time interval	=	2 min	Hyd. volume	=	7,446 cuft
Inflow hyd. No.	=	20 - Post to Bed 1/Basin	Max. Elevation	=	340.35 ft
Reservoir name	=	UG Bed 1/Basin	Max. Storage	=	12,744 cuft

Storage Indication method used.

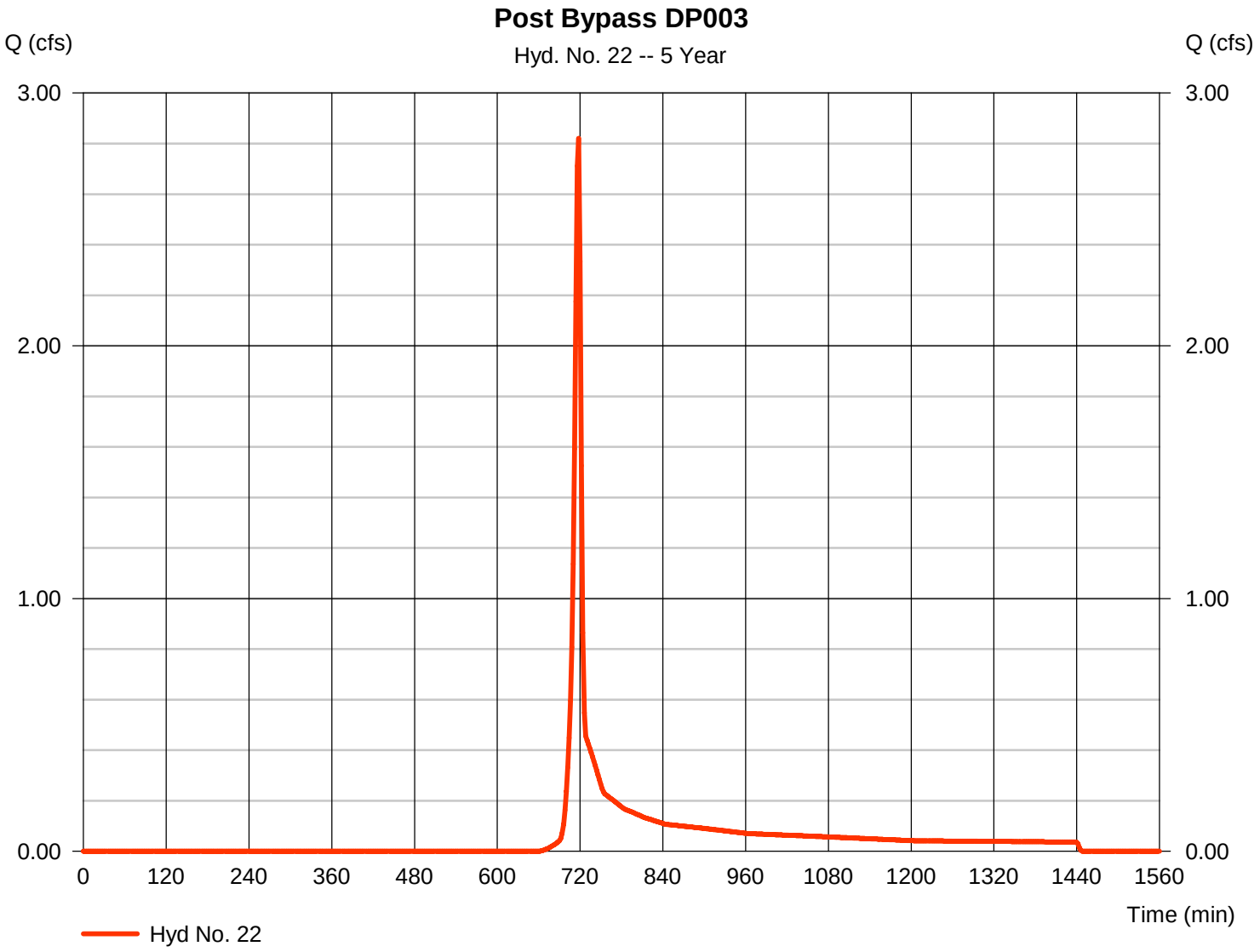


Hydrograph Report

Hyd. No. 22

Post Bypass DP003

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.821 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	5,670 cuft
Drainage area	=	1.340 ac	Curve number	=	67.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.08 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

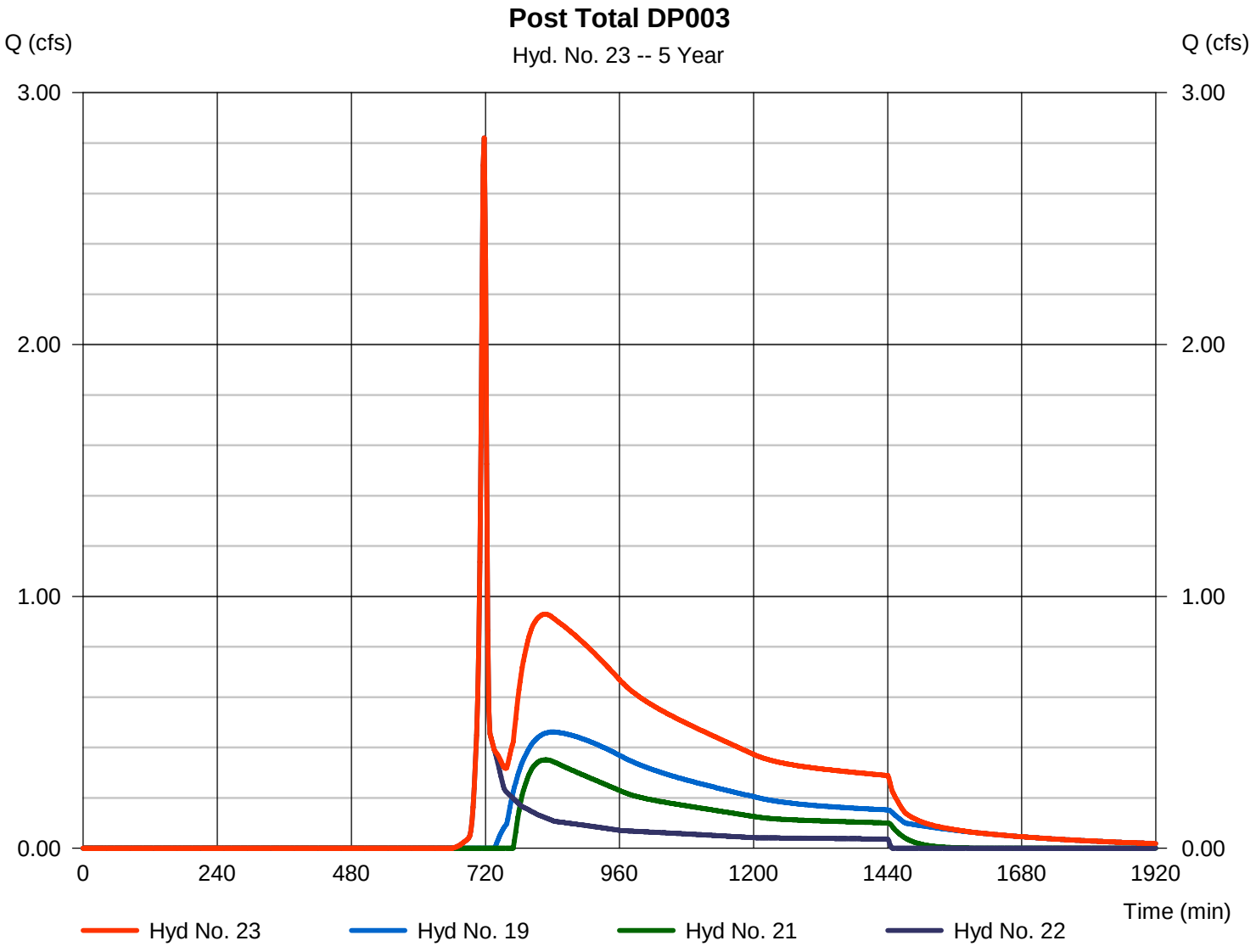


Hydrograph Report

Hyd. No. 23

Post Total DP003

Hydrograph type	=	Combine	Peak discharge	=	2.821 cfs
Storm frequency	=	5 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	26,276 cuft
Inflow hyds.	=	19, 21, 22	Contrib. drain. area	=	1.340 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

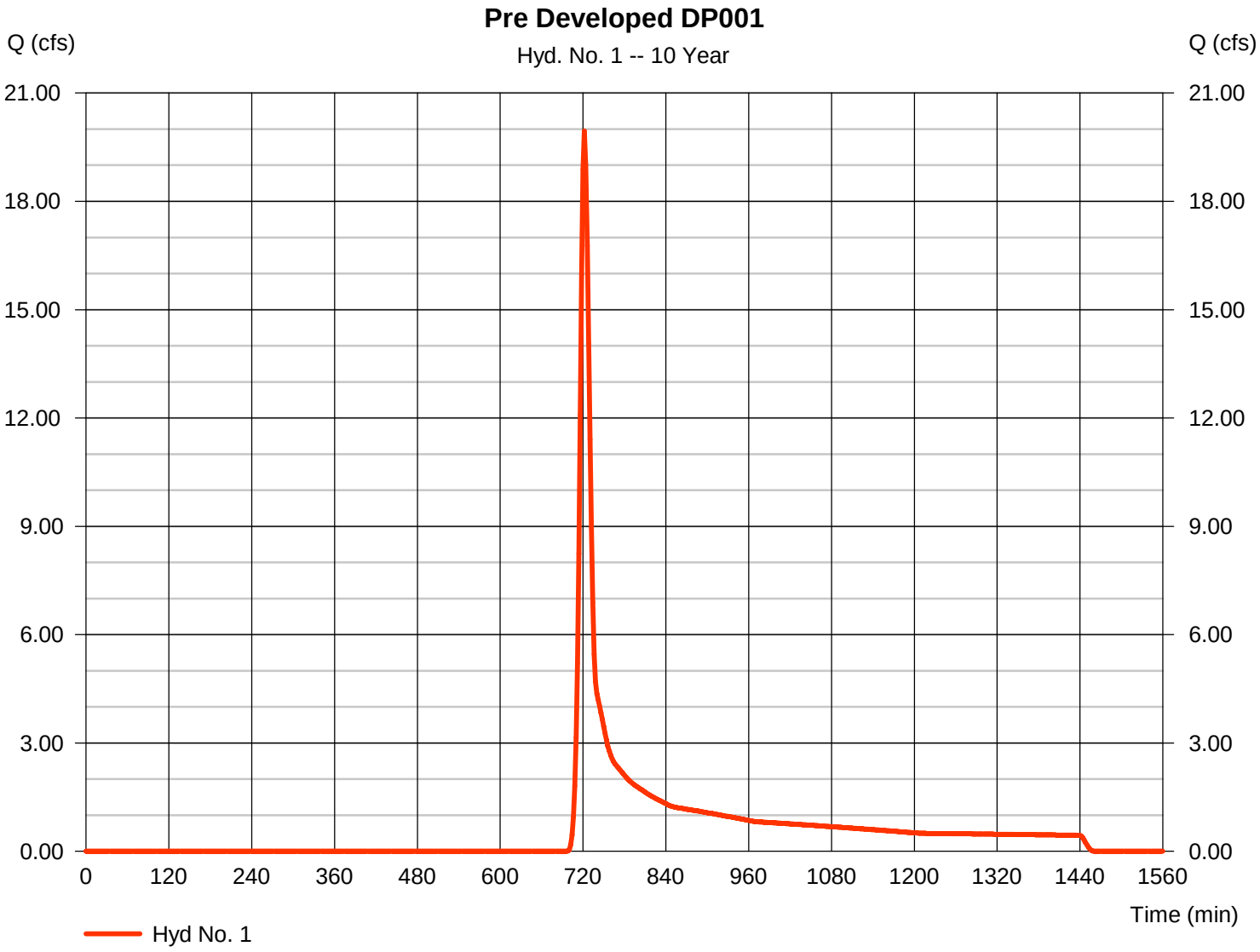
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	19.95	2	722	58,584	------	------	------	Pre Developed DP001
2	SCS Runoff	28.64	2	722	81,339	------	------	------	Pre Developed DP002
3	SCS Runoff	20.20	2	722	53,341	------	------	------	Pre Developed DP003
4	SCS Runoff	1.766	2	718	3,580	------	------	------	Pre Developed DP003 ORA
5	SCS Runoff	40.29	2	718	80,710	------	------	------	Post Basin 3
6	Reservoir	1.664	2	818	43,527	5	318.48	47,774	Basin 3 Routed
7	SCS Runoff	3.349	2	718	6,757	------	------	------	Post Bypass DP001
8	Combine	3.349	2	718	50,283	6, 7	------	------	Post Total DP001
10	SCS Runoff	37.29	2	718	74,773	------	------	------	Post Basin 1
11	Reservoir	1.244	2	848	37,284	10	322.89	46,611	Basin 1 Upper Routed
12	Reservoir	0.928	2	996	31,087	11	304.57	10,321	Basin 1 Lower Routed
13	SCS Runoff	34.26	2	716	69,196	------	------	------	Post Basin 2
14	Reservoir	1.706	2	788	36,842	13	309.33	40,115	Basin 2 Routed
15	SCS Runoff	3.170	2	718	6,463	------	------	------	Post Bypass DP002
16	Combine	3.170	2	718	74,392	12, 14, 15	------	------	Post Total DP002
18	SCS Runoff	17.42	2	716	35,181	------	------	------	Post to Basin 4
19	Reservoir	1.213	2	758	21,376	18	346.82	18,757	Basin 4 Routed
20	SCS Runoff	12.38	2	716	25,081	------	------	------	Post to Bed 1/Basin
21	Reservoir	1.100	2	748	12,984	20	340.55	13,588	UG Bed 1/Basin Routed
22	SCS Runoff	3.883	2	718	7,766	------	------	------	Post Bypass DP003
23	Combine	3.883	2	718	42,126	19, 21, 22	------	------	Post Total DP003

Hydrograph Report

Hyd. No. 1

Pre Developed DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	19.95 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	58,584 cuft
Drainage area	=	15.430 ac	Curve number	=	57.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

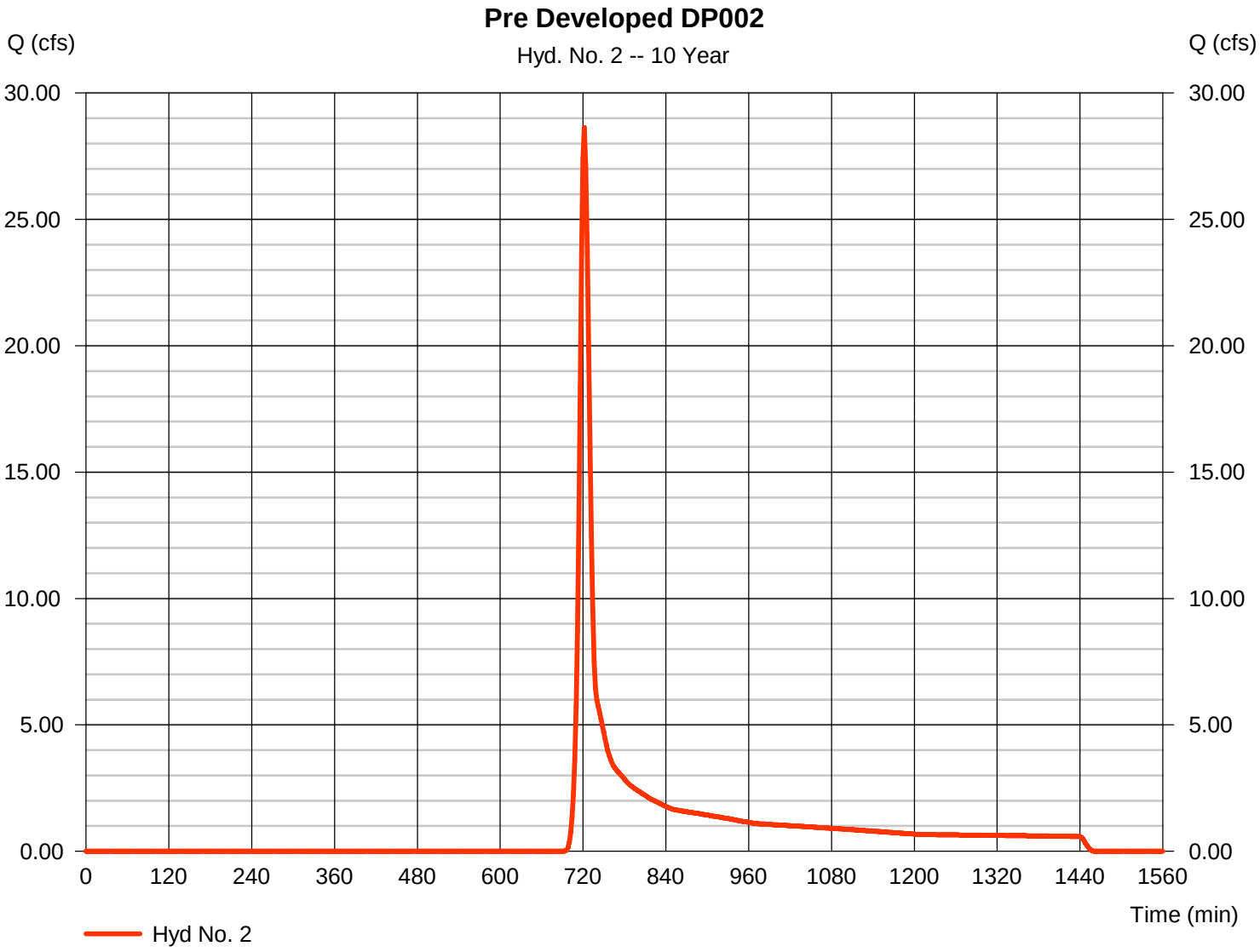


Hydrograph Report

Hyd. No. 2

Pre Developed DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.64 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	81,339 cuft
Drainage area	=	19.210 ac	Curve number	=	59.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

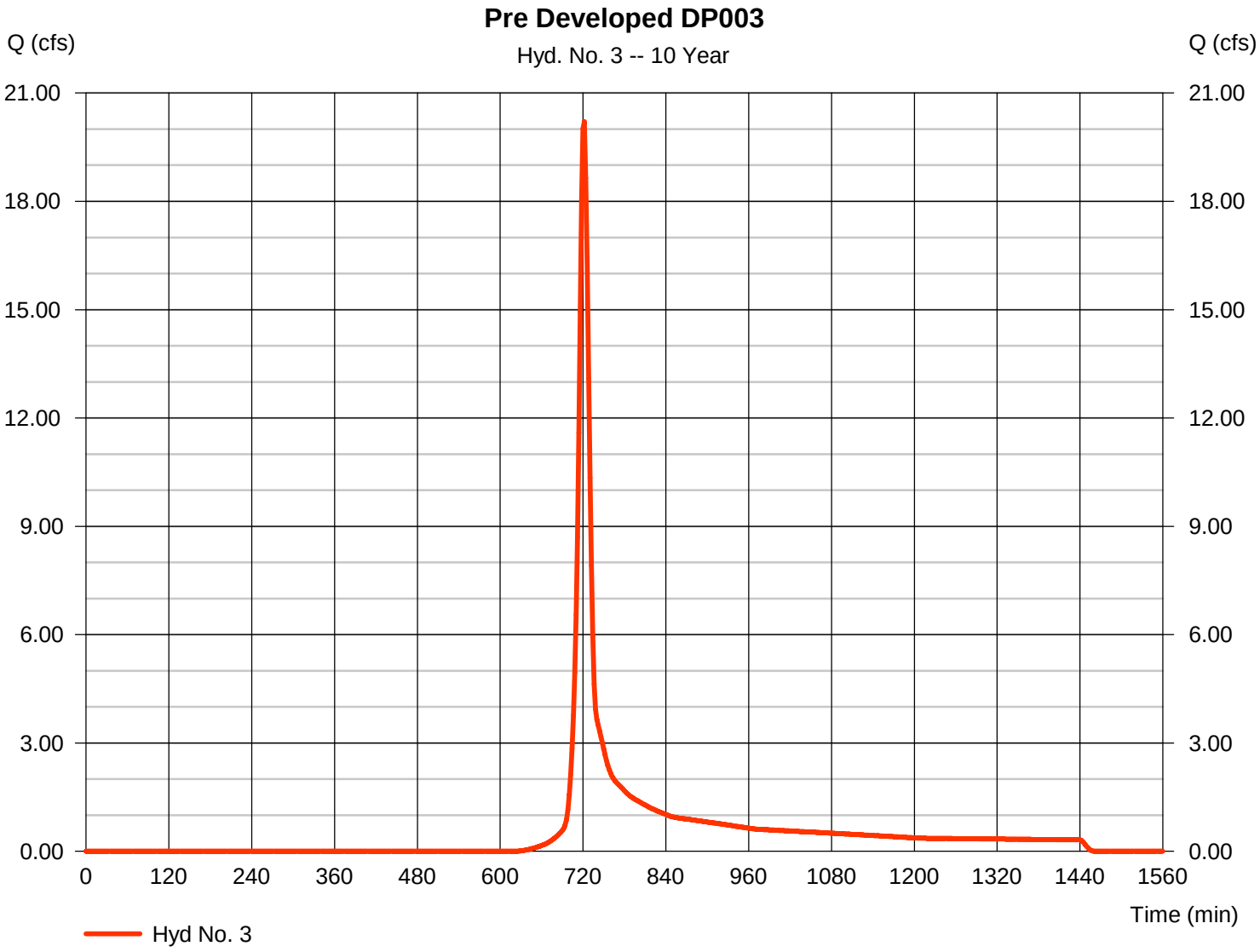


Hydrograph Report

Hyd. No. 3

Pre Developed DP003

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.20 cfs
Storm frequency	=	10 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	53,341 cuft
Drainage area	=	8.190 ac	Curve number	=	68.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

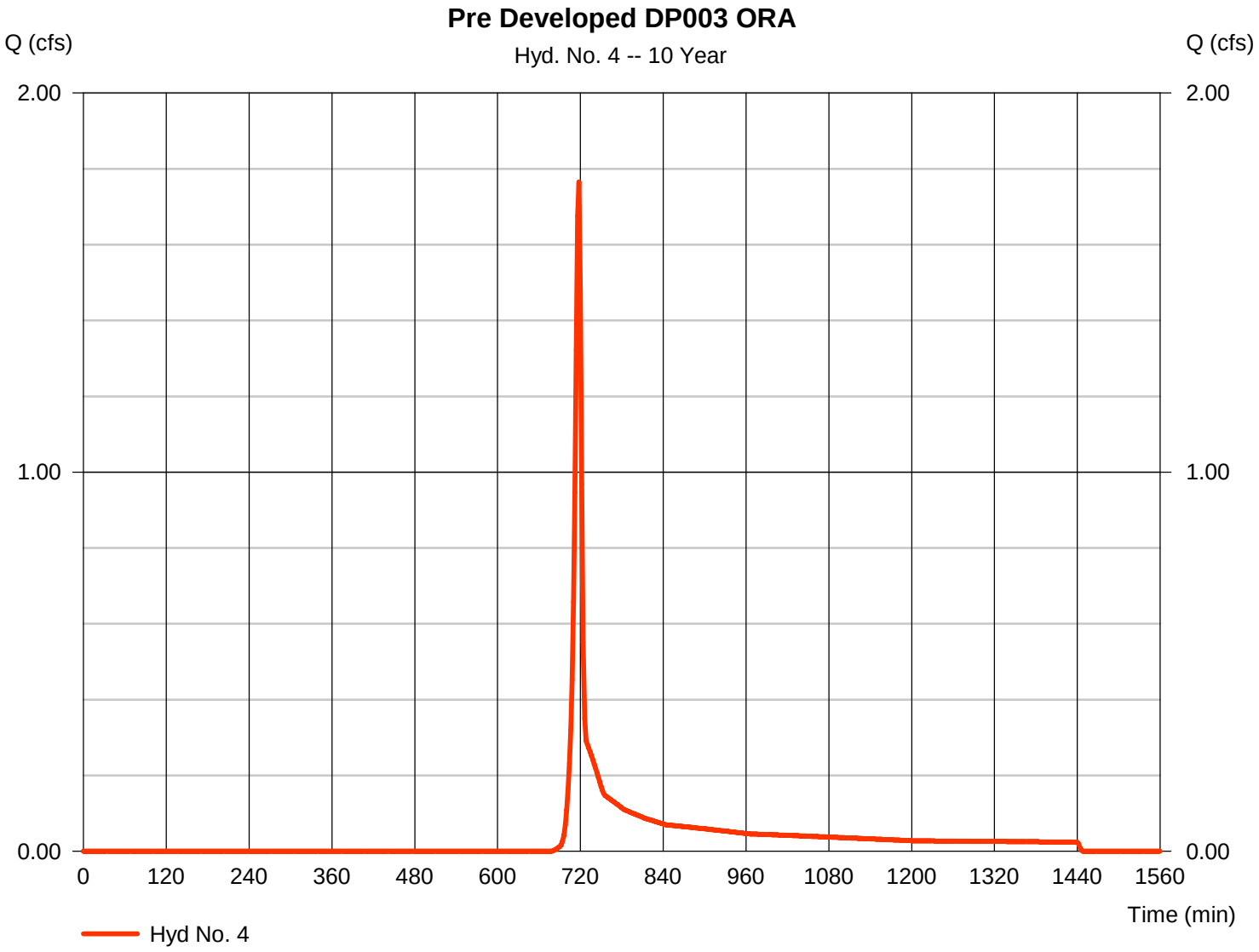


Hydrograph Report

Hyd. No. 4

Pre Developed DP003 ORA

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.766 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	3,580 cuft
Drainage area	=	0.810 ac	Curve number	=	62
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

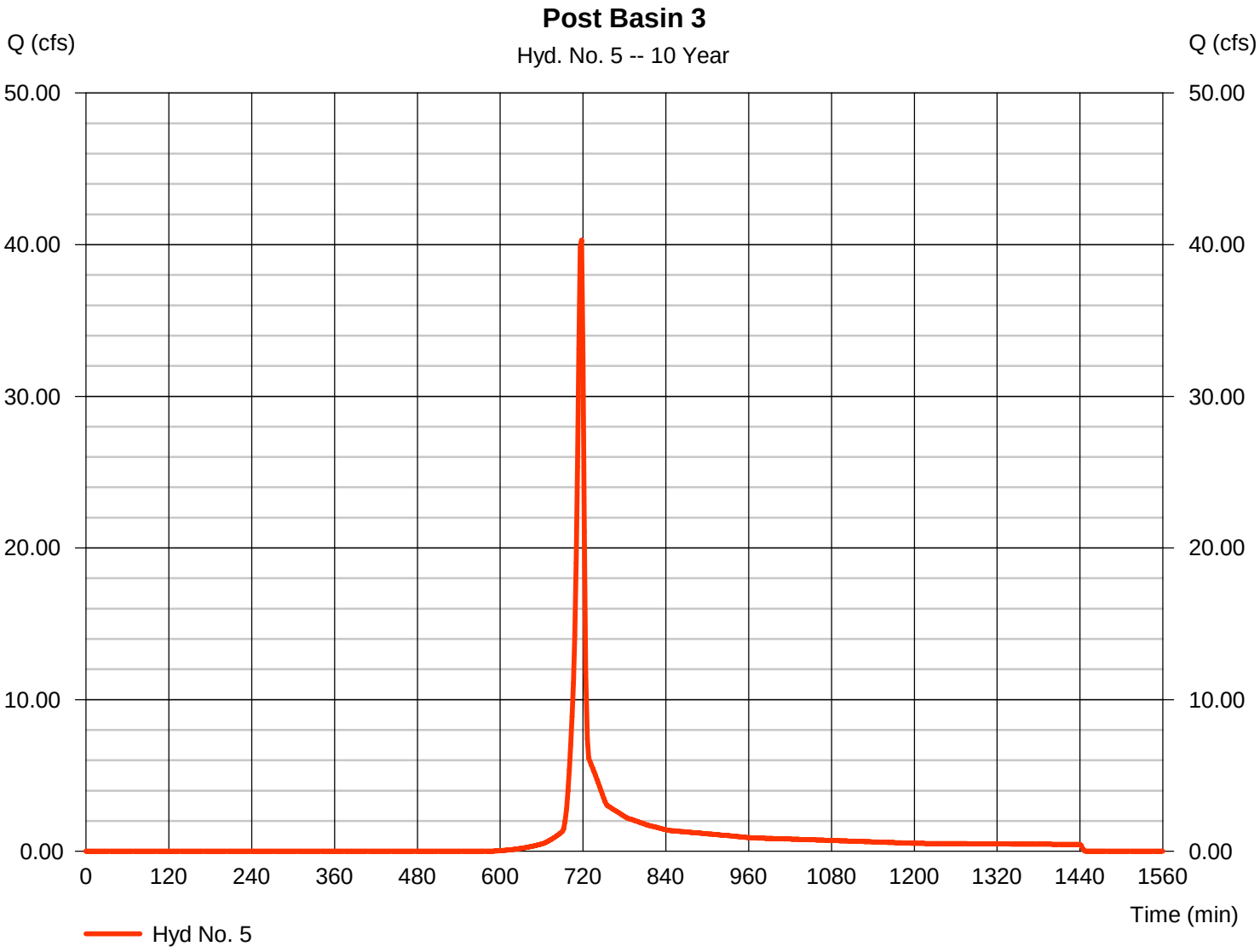


Hydrograph Report

Hyd. No. 5

Post Basin 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	40.29 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	80,710 cuft
Drainage area	=	12.150 ac	Curve number	=	71.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



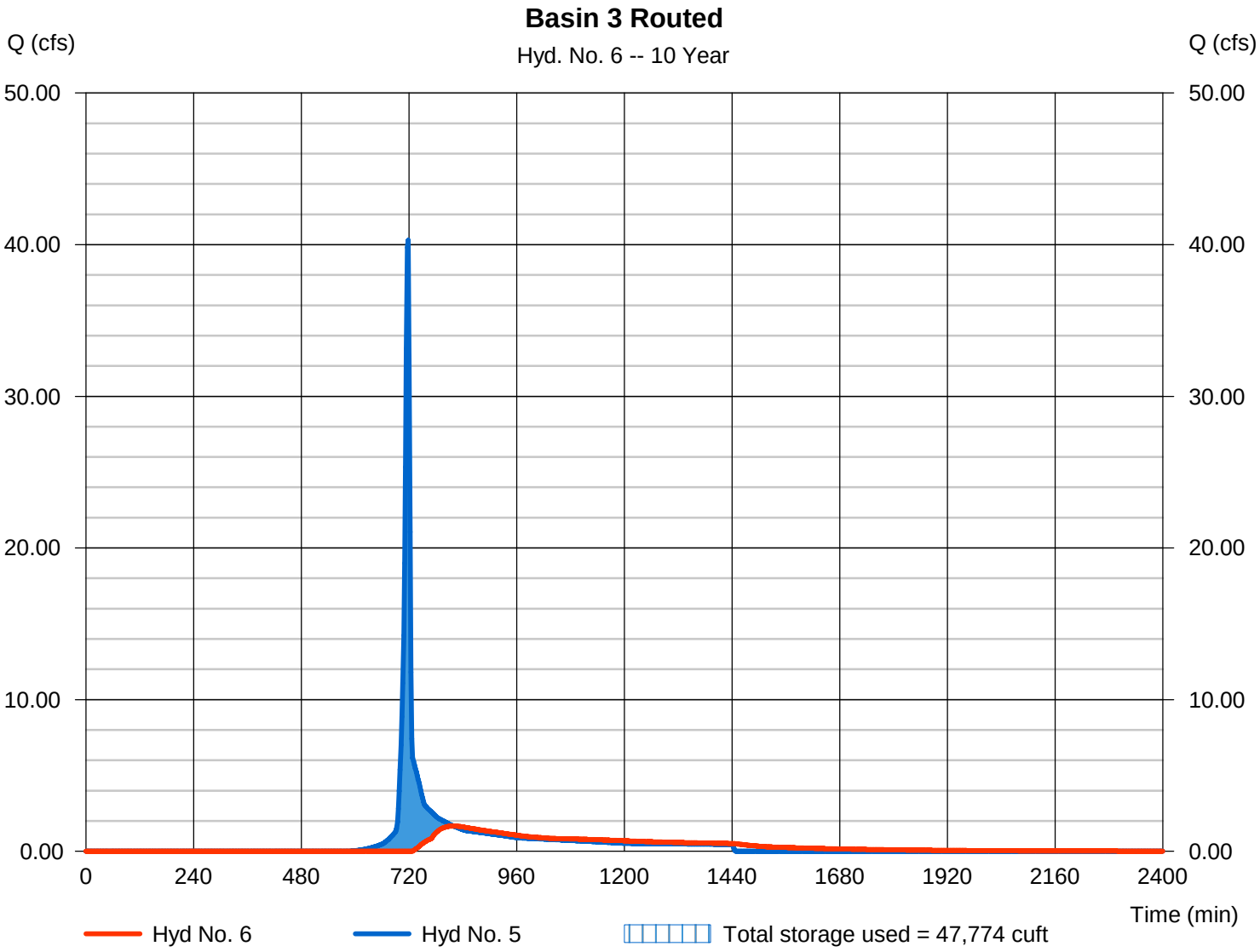
Hydrograph Report

Hyd. No. 6

Basin 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	1.664 cfs
Storm frequency	=	10 yrs	Time to peak	=	818 min
Time interval	=	2 min	Hyd. volume	=	43,527 cuft
Inflow hyd. No.	=	5 - Post Basin 3	Max. Elevation	=	318.48 ft
Reservoir name	=	Basin 3	Max. Storage	=	47,774 cuft

Storage Indication method used.

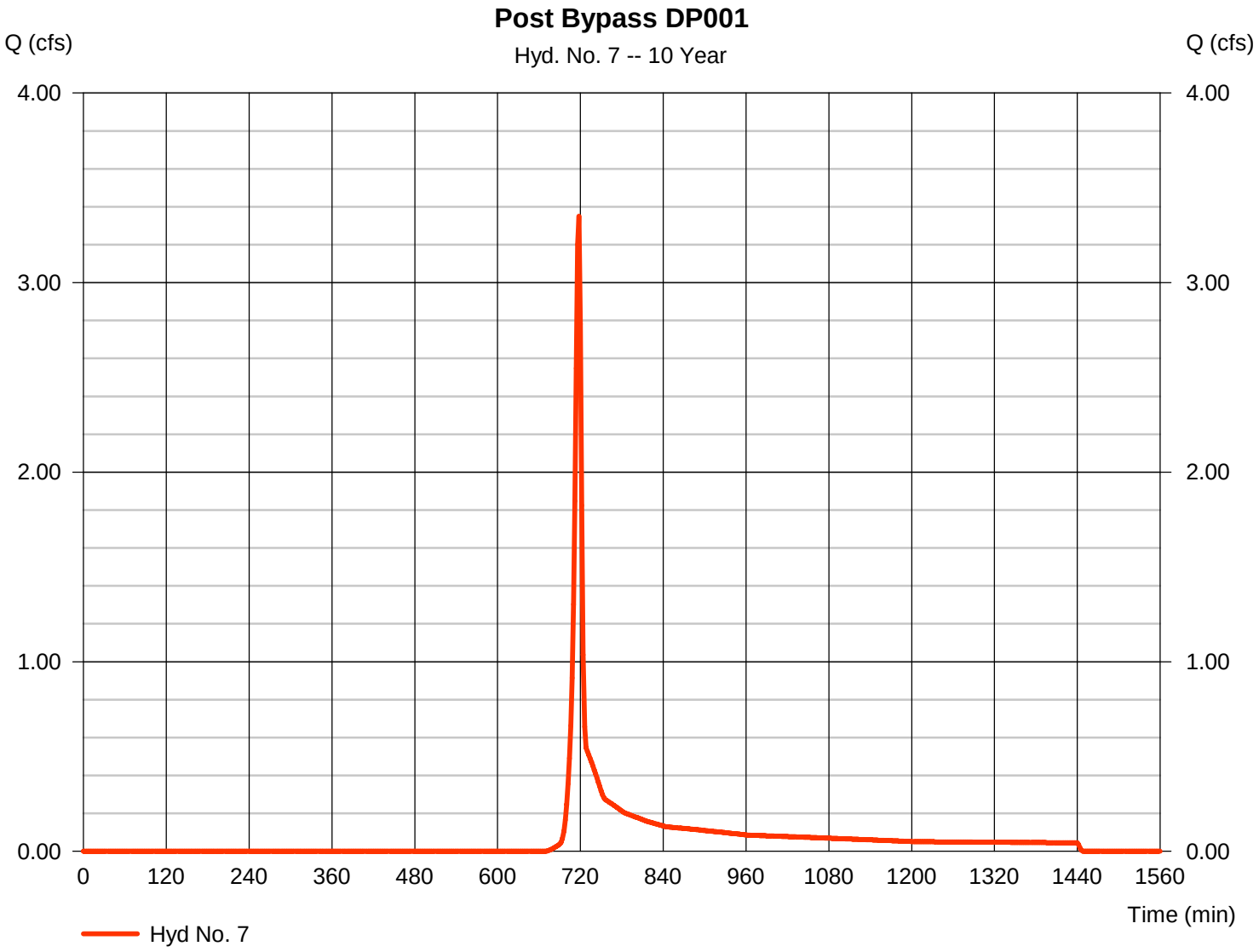


Hydrograph Report

Hyd. No. 7

Post Bypass DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.349 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	6,757 cuft
Drainage area	=	1.440 ac	Curve number	=	63.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

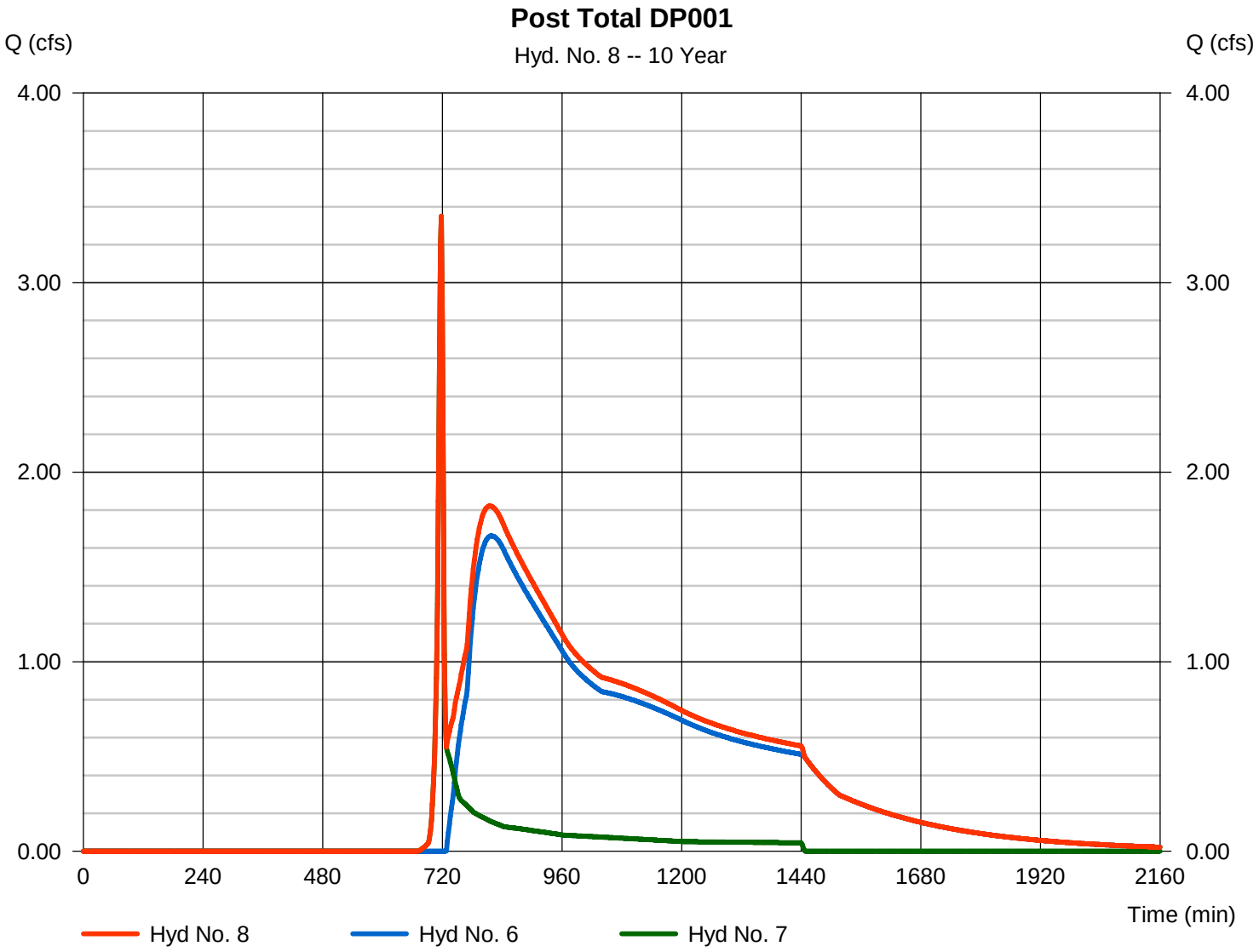


Hydrograph Report

Hyd. No. 8

Post Total DP001

Hydrograph type	= Combine	Peak discharge	= 3.349 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 50,283 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.440 ac

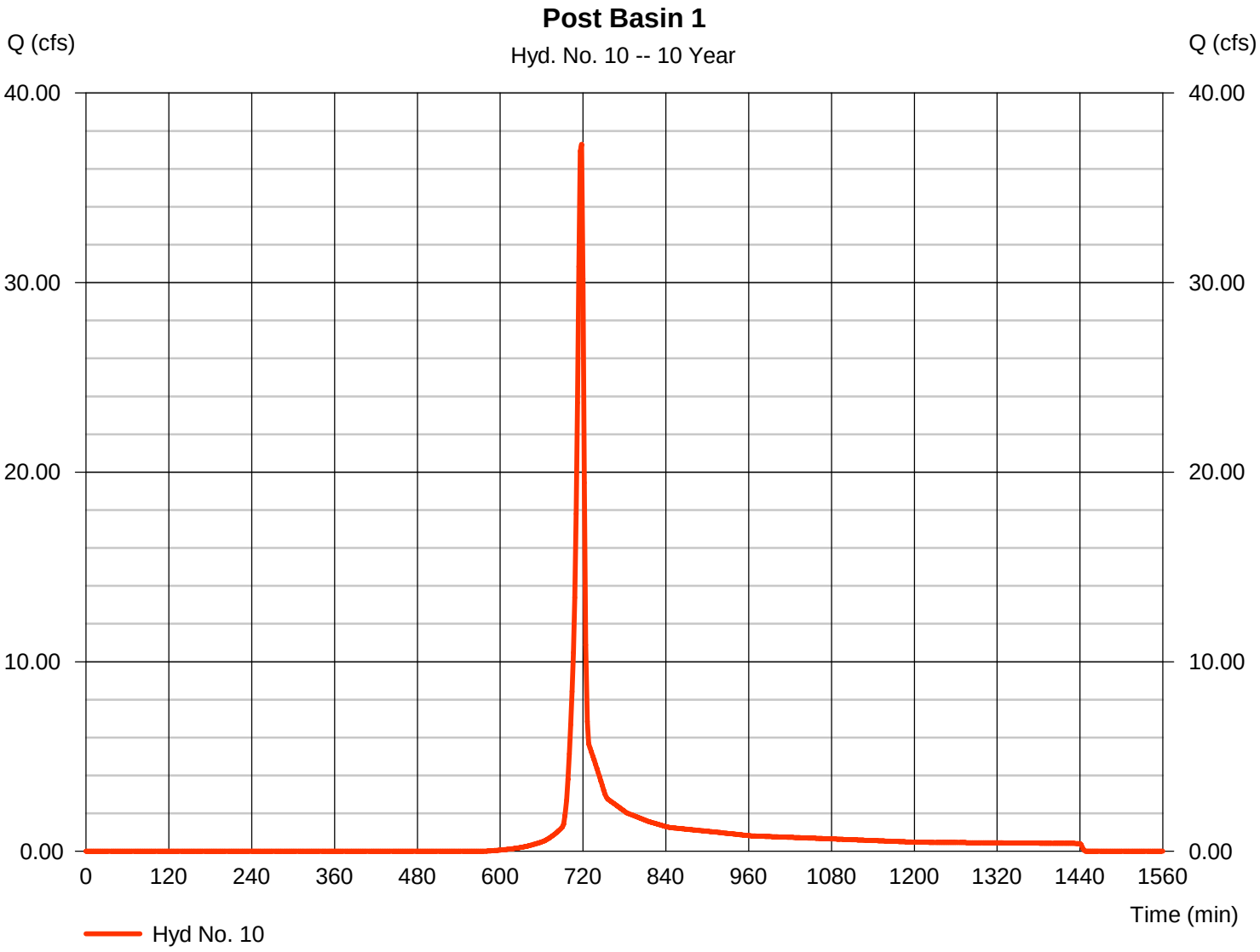


Hydrograph Report

Hyd. No. 10

Post Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	37.29 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	74,773 cuft
Drainage area	=	10.950 ac	Curve number	=	71.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



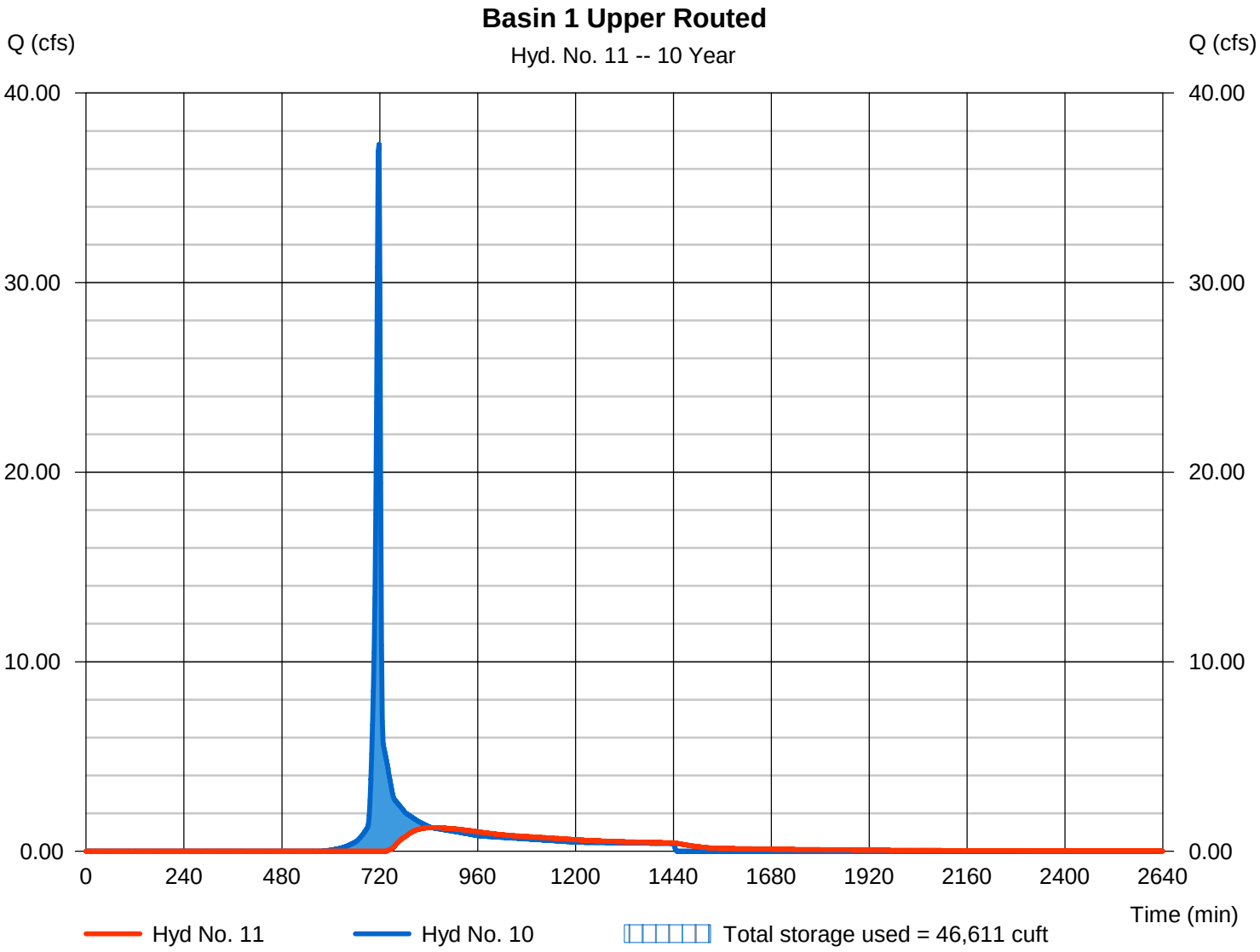
Hydrograph Report

Hyd. No. 11

Basin 1 Upper Routed

Hydrograph type	=	Reservoir	Peak discharge	=	1.244 cfs
Storm frequency	=	10 yrs	Time to peak	=	848 min
Time interval	=	2 min	Hyd. volume	=	37,284 cuft
Inflow hyd. No.	=	10 - Post Basin 1	Max. Elevation	=	322.89 ft
Reservoir name	=	Basin 1 Upper	Max. Storage	=	46,611 cuft

Storage Indication method used.



Hydrograph Report

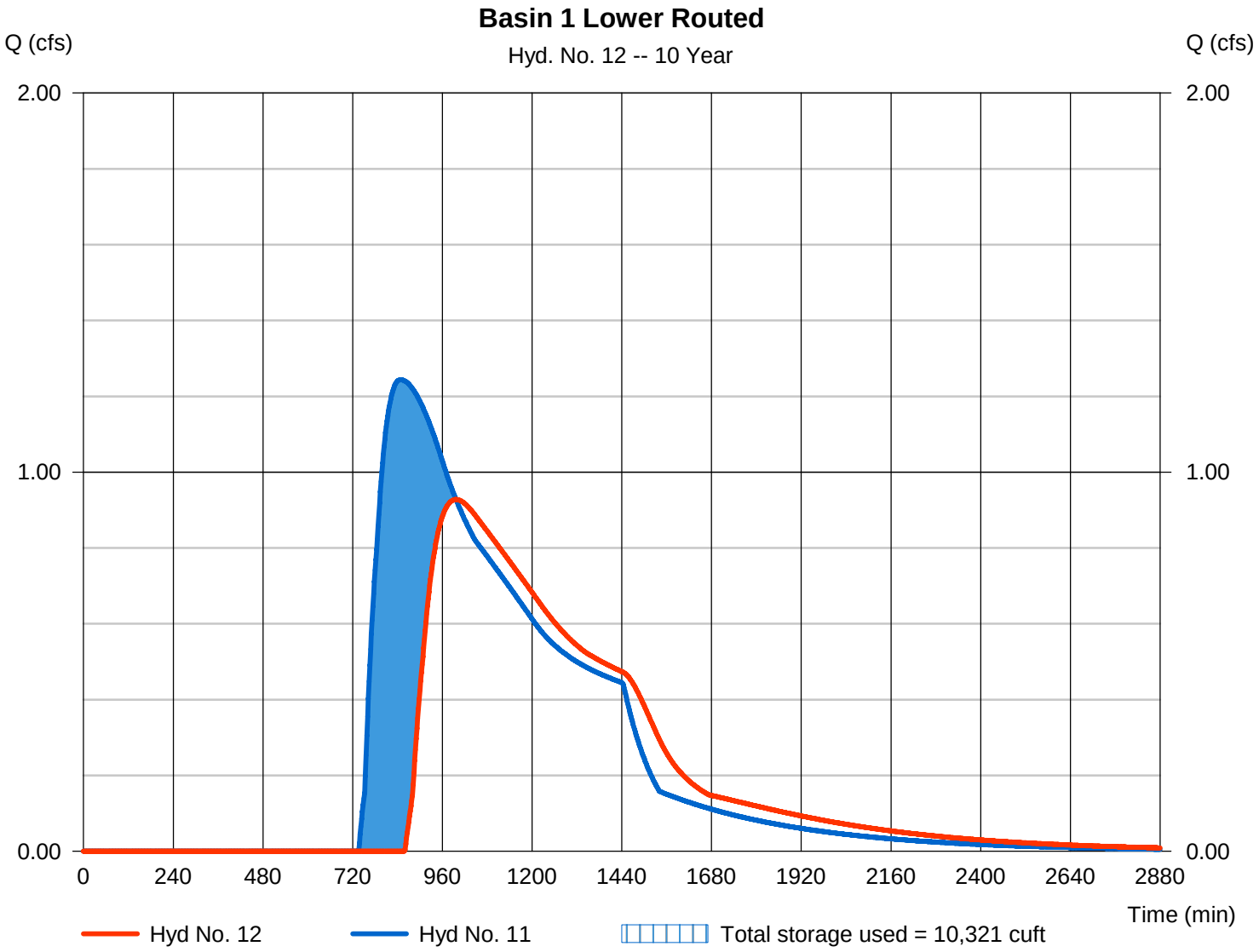
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 13 / 2023

Hyd. No. 12

Basin 1 Lower Routed

Hydrograph type	=	Reservoir	Peak discharge	=	0.928 cfs
Storm frequency	=	10 yrs	Time to peak	=	996 min
Time interval	=	2 min	Hyd. volume	=	31,087 cuft
Inflow hyd. No.	=	11 - Basin 1 Upper Routed	Max. Elevation	=	304.57 ft
Reservoir name	=	Basin 1 Lower	Max. Storage	=	10,321 cuft

Storage Indication method used.

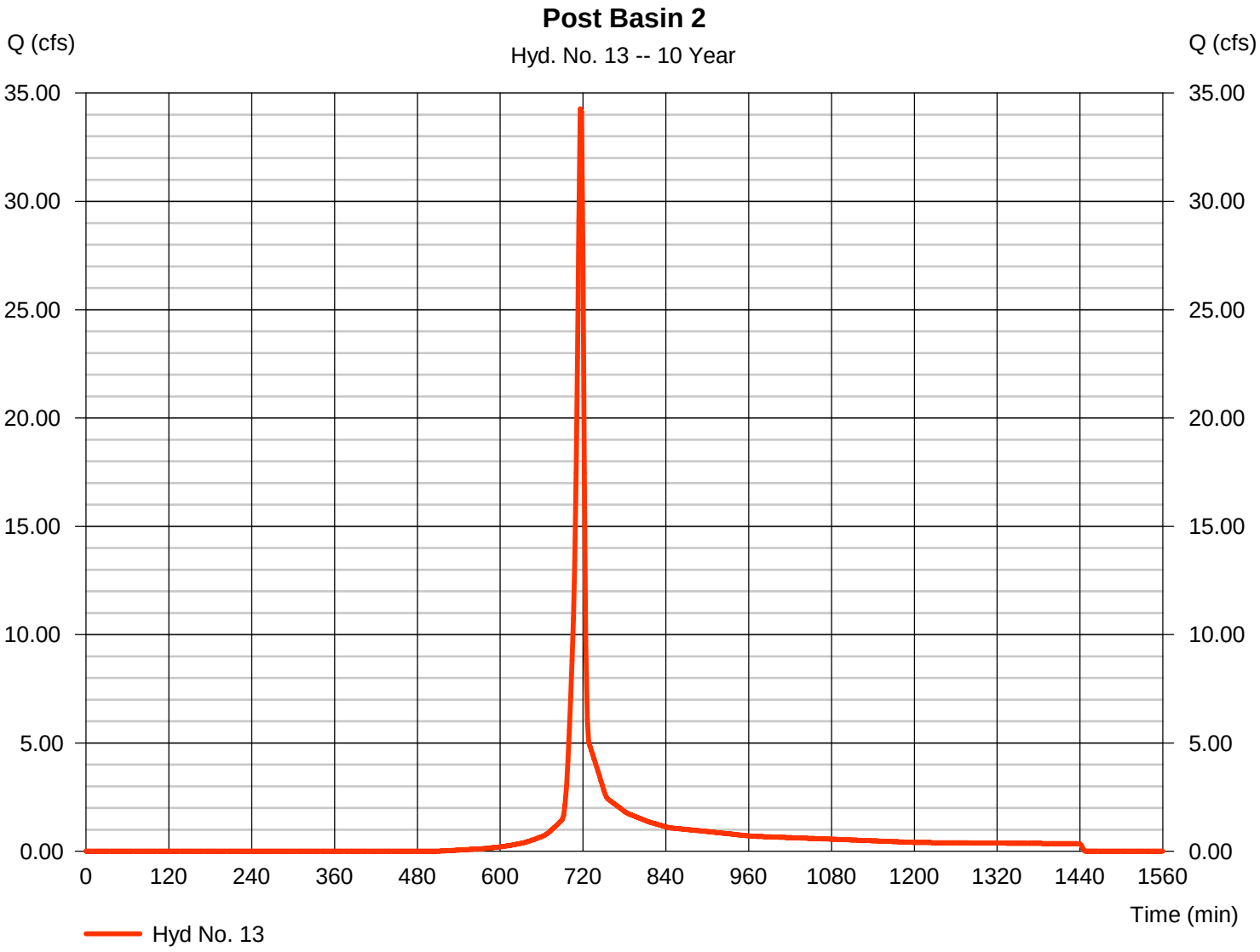


Hydrograph Report

Hyd. No. 13

Post Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	34.26 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	69,196 cuft
Drainage area	=	8.540 ac	Curve number	=	76.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



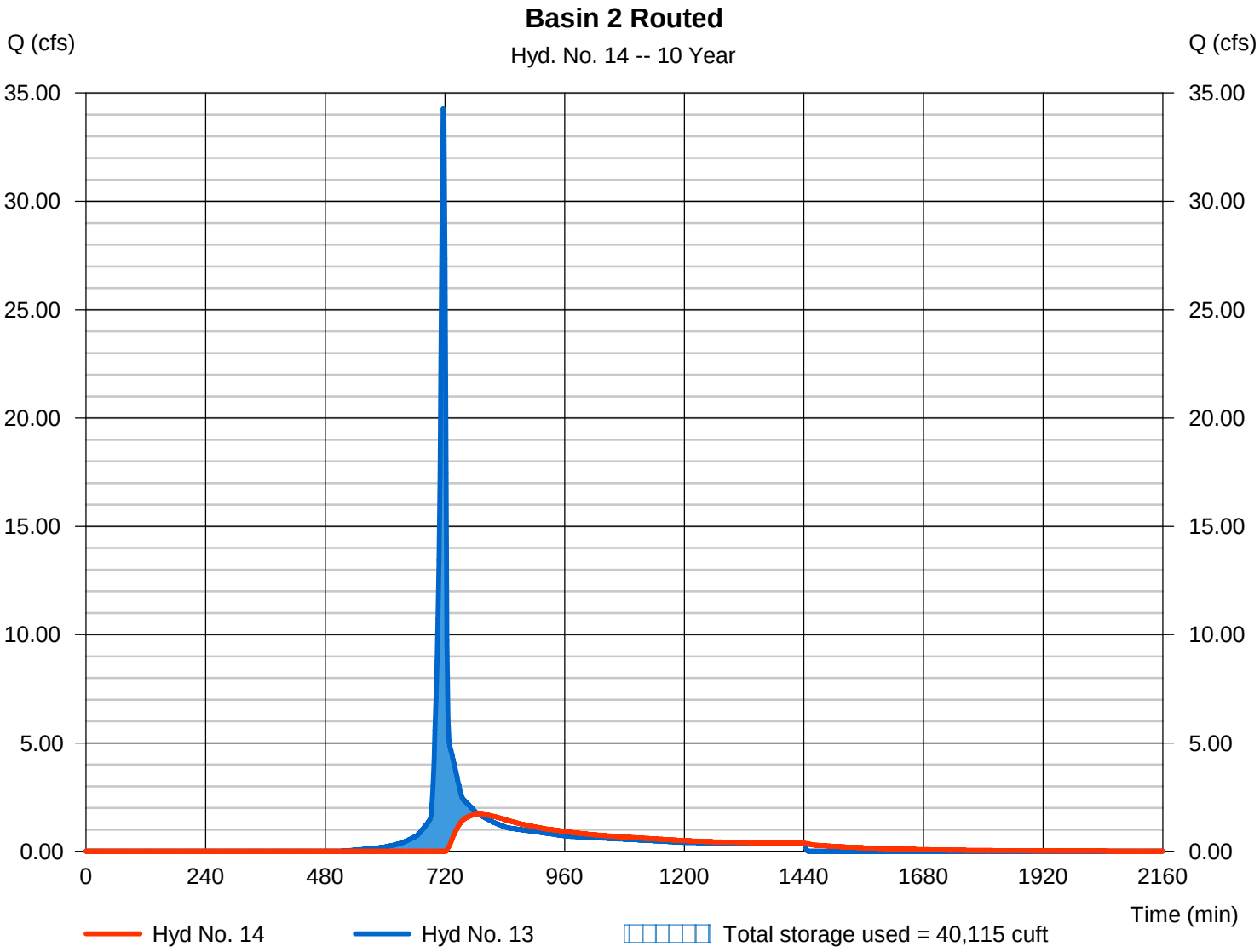
Hydrograph Report

Hyd. No. 14

Basin 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	1.706 cfs
Storm frequency	=	10 yrs	Time to peak	=	788 min
Time interval	=	2 min	Hyd. volume	=	36,842 cuft
Inflow hyd. No.	=	13 - Post Basin 2	Max. Elevation	=	309.33 ft
Reservoir name	=	Basin 2	Max. Storage	=	40,115 cuft

Storage Indication method used.

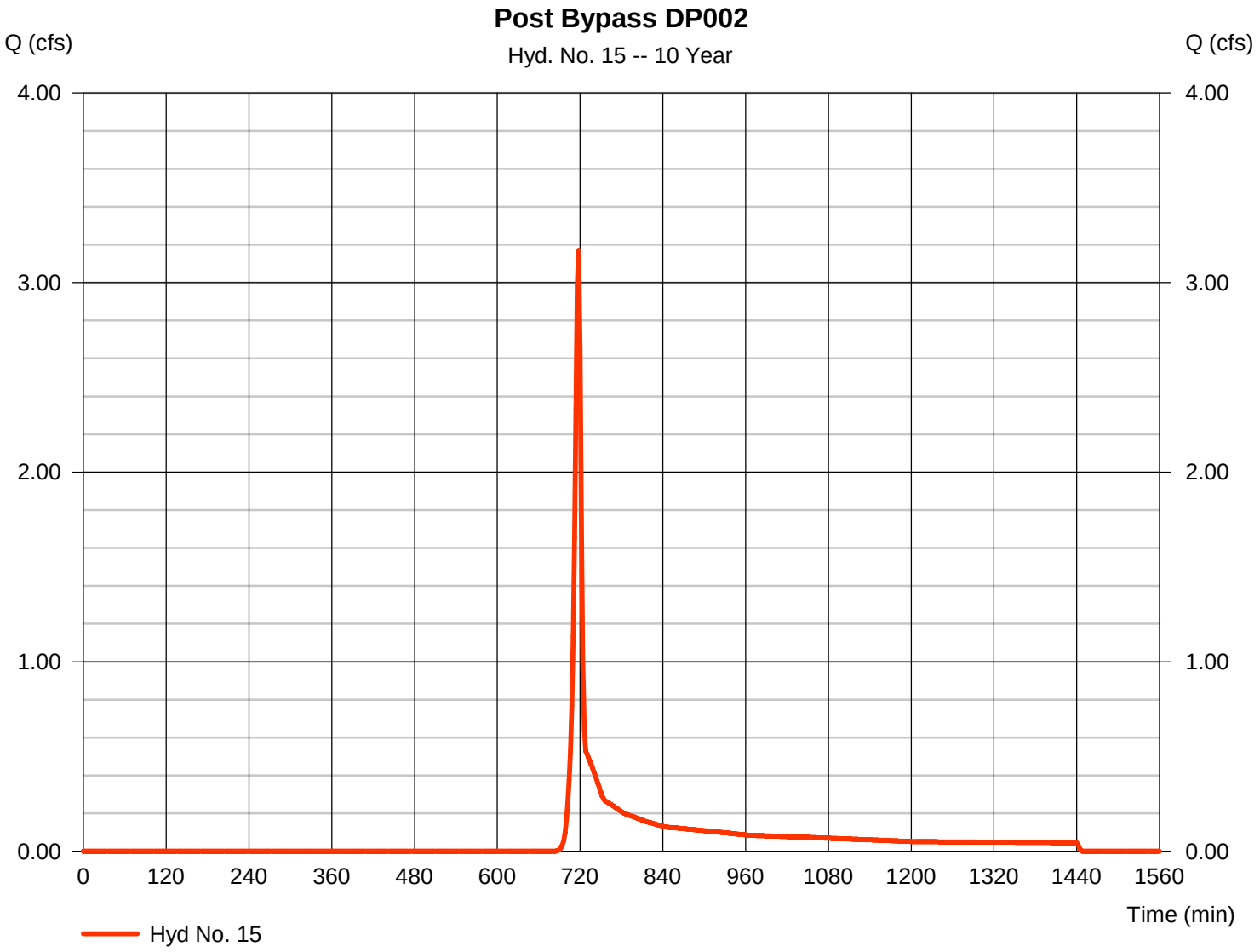


Hydrograph Report

Hyd. No. 15

Post Bypass DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.170 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	6,463 cuft
Drainage area	=	1.540 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

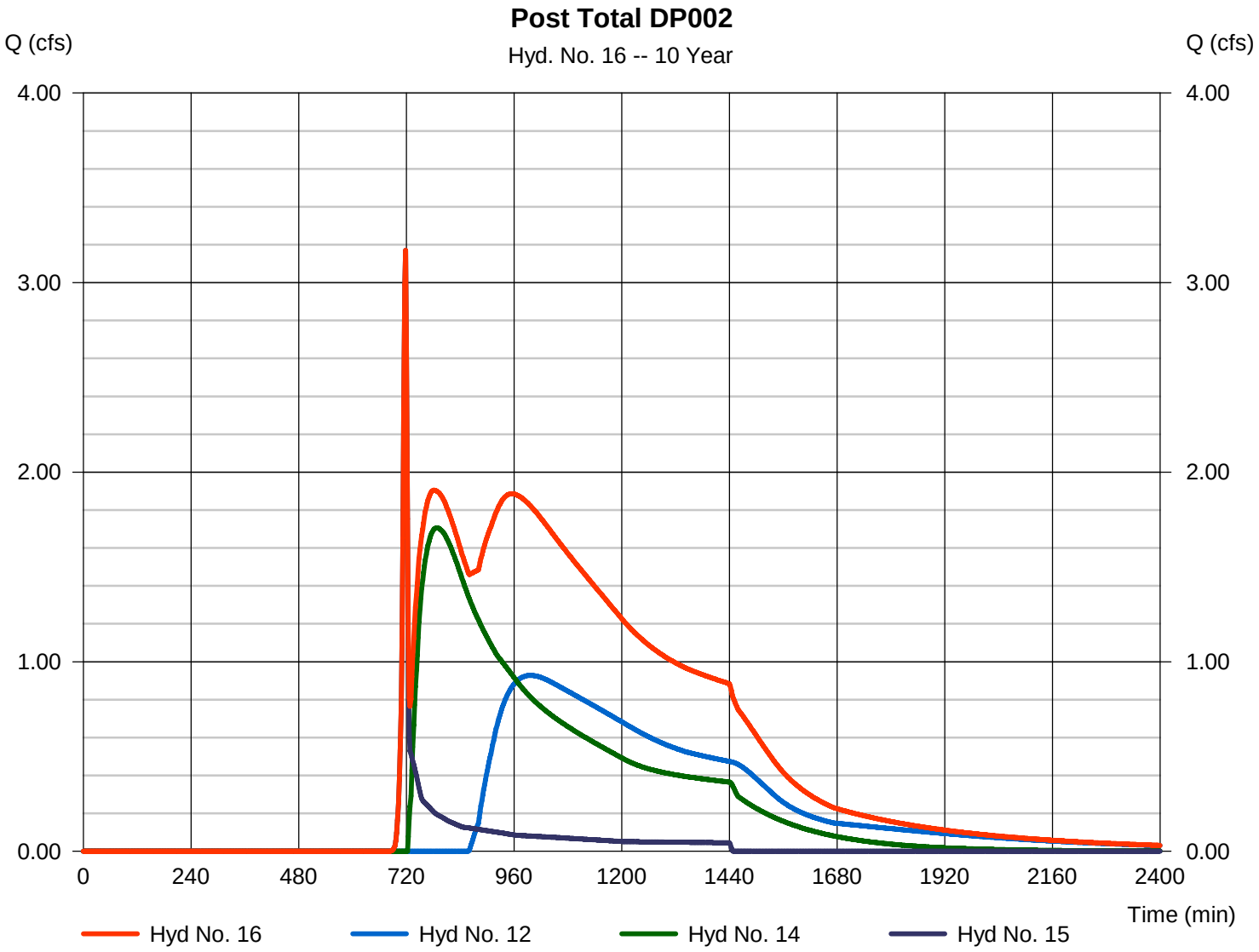


Hydrograph Report

Hyd. No. 16

Post Total DP002

Hydrograph type	=	Combine	Peak discharge	=	3.170 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	74,392 cuft
Inflow hyds.	=	12, 14, 15	Contrib. drain. area	=	1.540 ac



Hydrograph Report

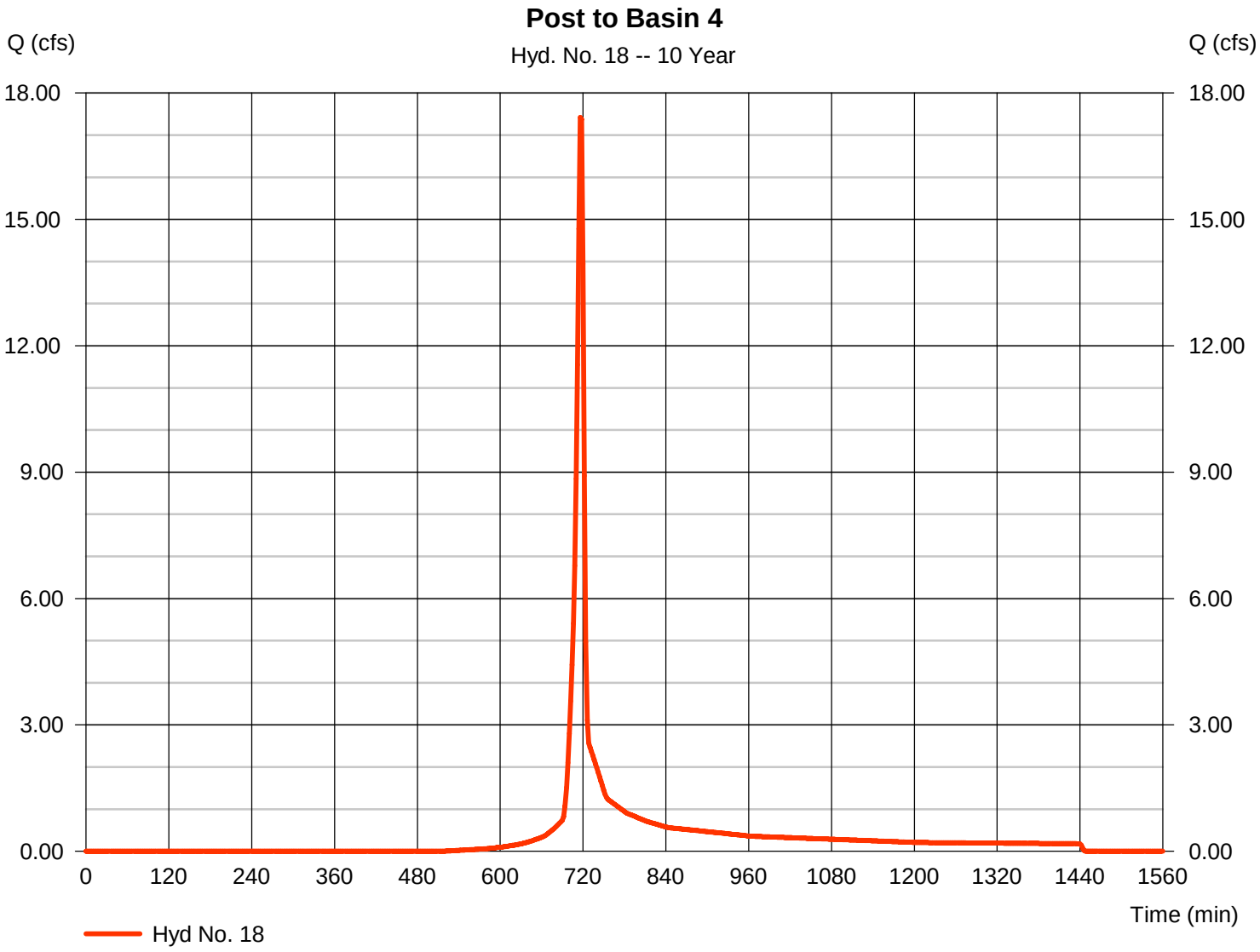
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 13 / 2023

Hyd. No. 18

Post to Basin 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	17.42 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	35,181 cuft
Drainage area	=	4.420 ac	Curve number	=	75.9*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.910 x 61) + (2.270 x 98) + (3.040 x 78)] / 4.420



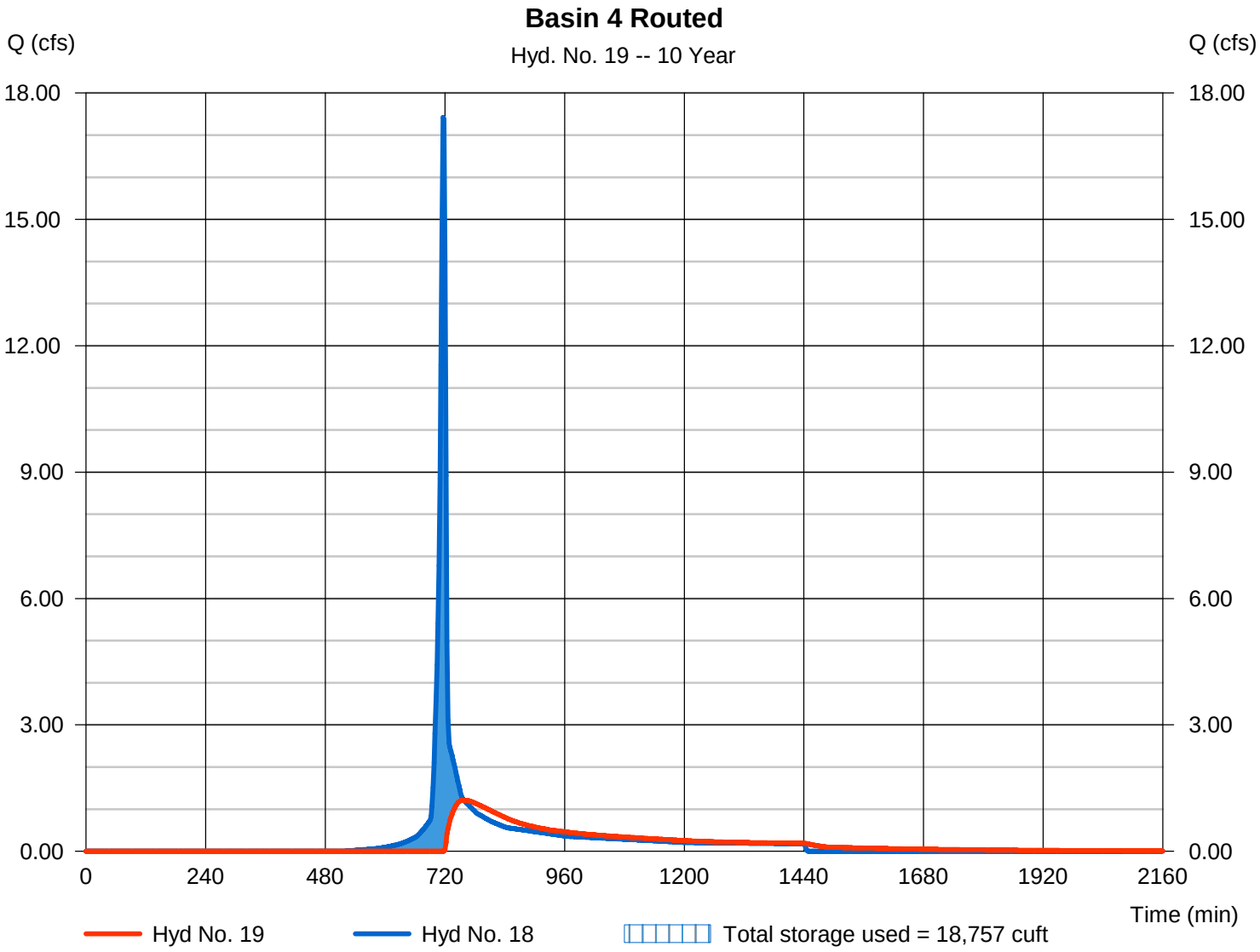
Hydrograph Report

Hyd. No. 19

Basin 4 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	1.213 cfs
Storm frequency	=	10 yrs	Time to peak	=	758 min
Time interval	=	2 min	Hyd. volume	=	21,376 cuft
Inflow hyd. No.	=	18 - Post to Basin 4	Max. Elevation	=	346.82 ft
Reservoir name	=	Basin 4	Max. Storage	=	18,757 cuft

Storage Indication method used.



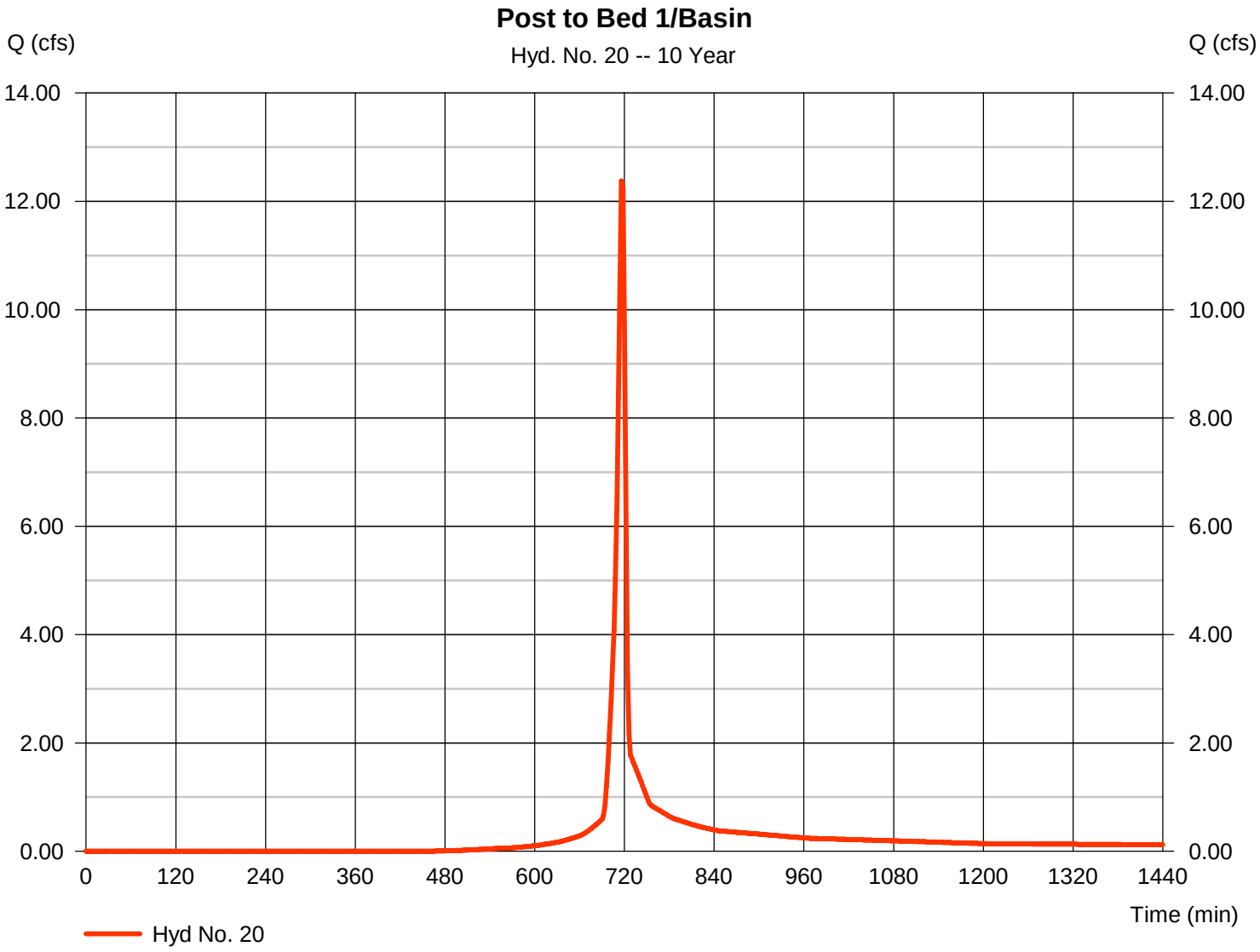
Hydrograph Report

Hyd. No. 20

Post to Bed 1/Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.38 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	25,081 cuft
Drainage area	=	2.820 ac	Curve number	=	79.1*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.910 x 61) + (2.270 x 98) + (3.040 x 78)] / 2.820



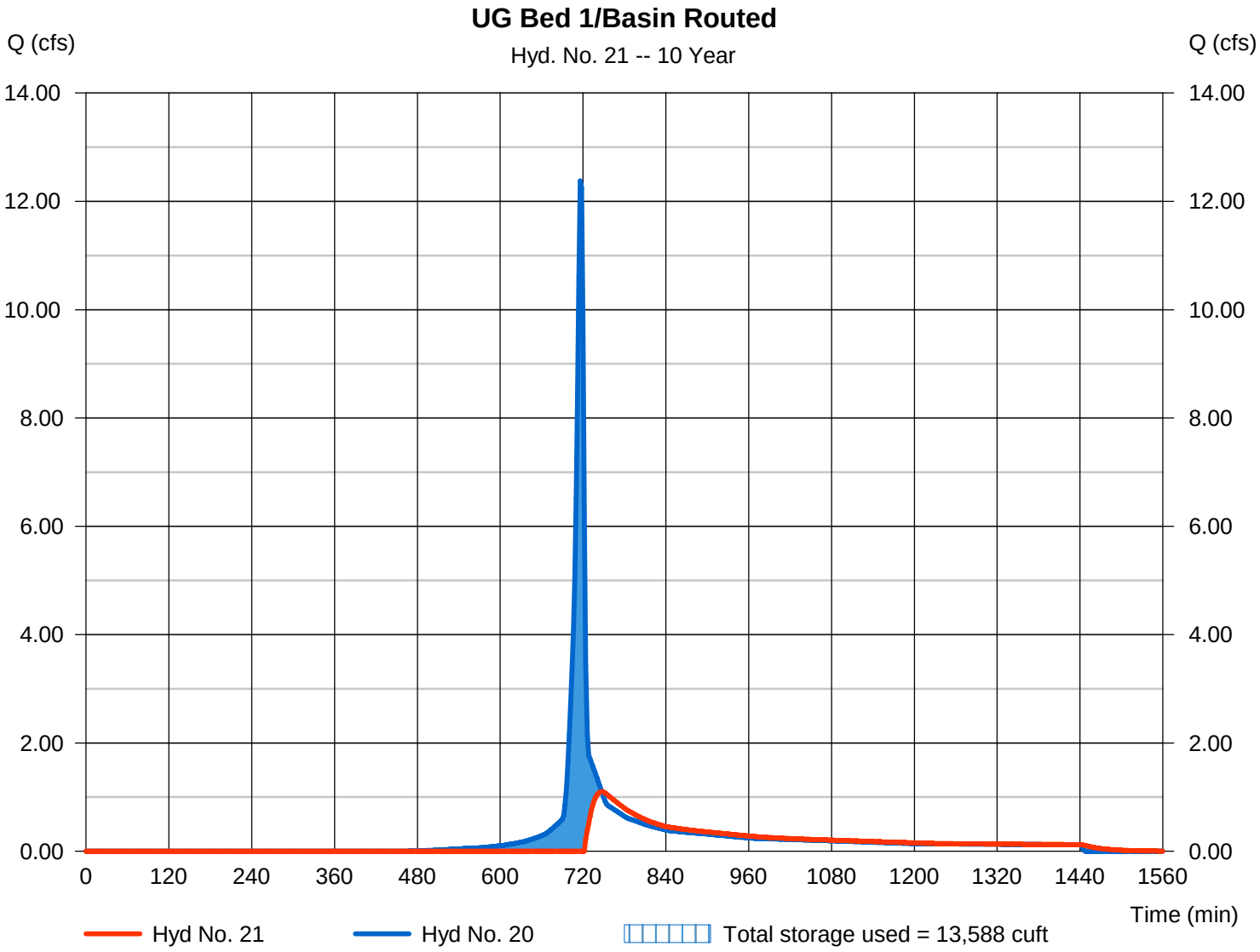
Hydrograph Report

Hyd. No. 21

UG Bed 1/Basin Routed

Hydrograph type	=	Reservoir	Peak discharge	=	1.100 cfs
Storm frequency	=	10 yrs	Time to peak	=	748 min
Time interval	=	2 min	Hyd. volume	=	12,984 cuft
Inflow hyd. No.	=	20 - Post to Bed 1/Basin	Max. Elevation	=	340.55 ft
Reservoir name	=	UG Bed 1/Basin	Max. Storage	=	13,588 cuft

Storage Indication method used.

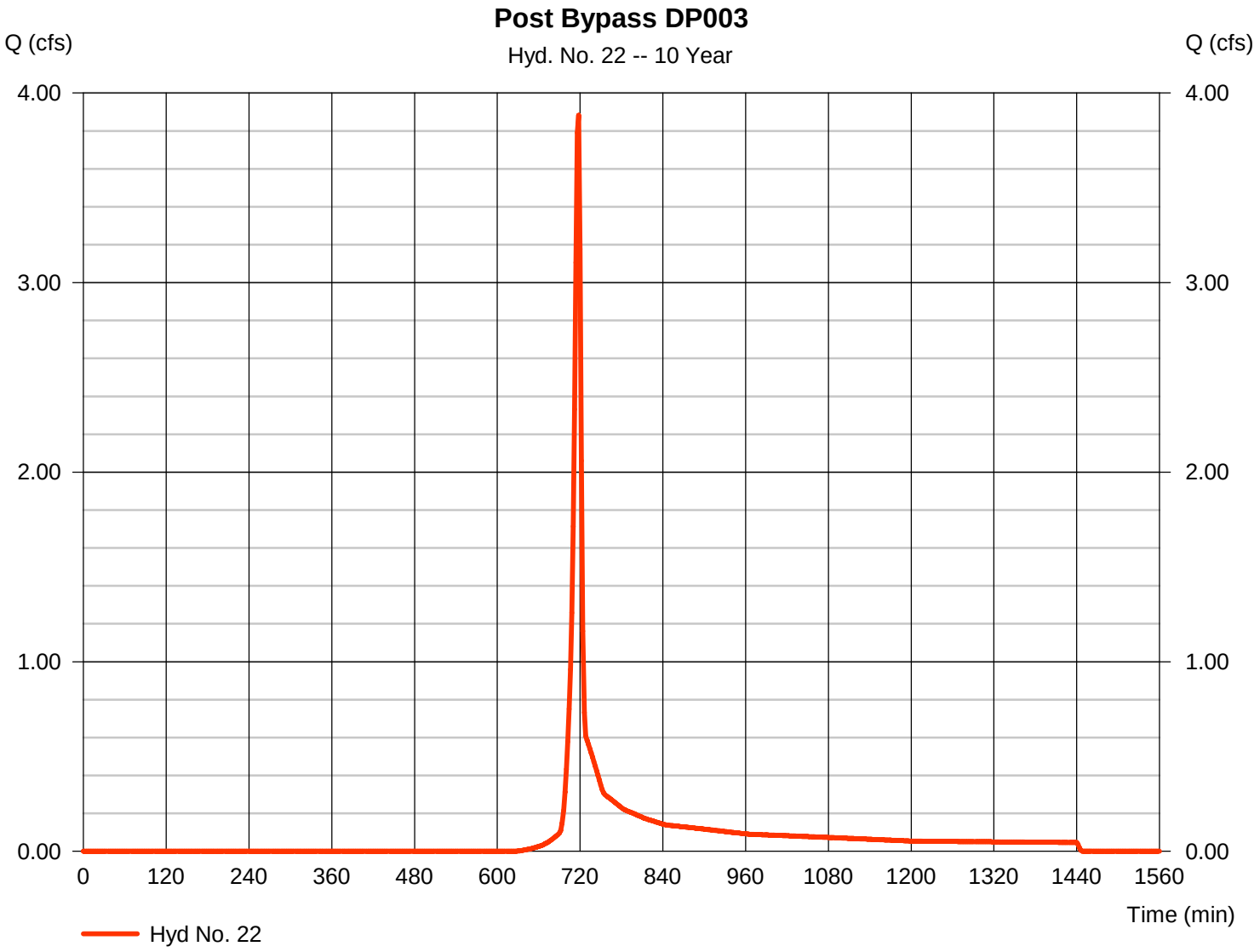


Hydrograph Report

Hyd. No. 22

Post Bypass DP003

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.883 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	7,766 cuft
Drainage area	=	1.340 ac	Curve number	=	67.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	4.77 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

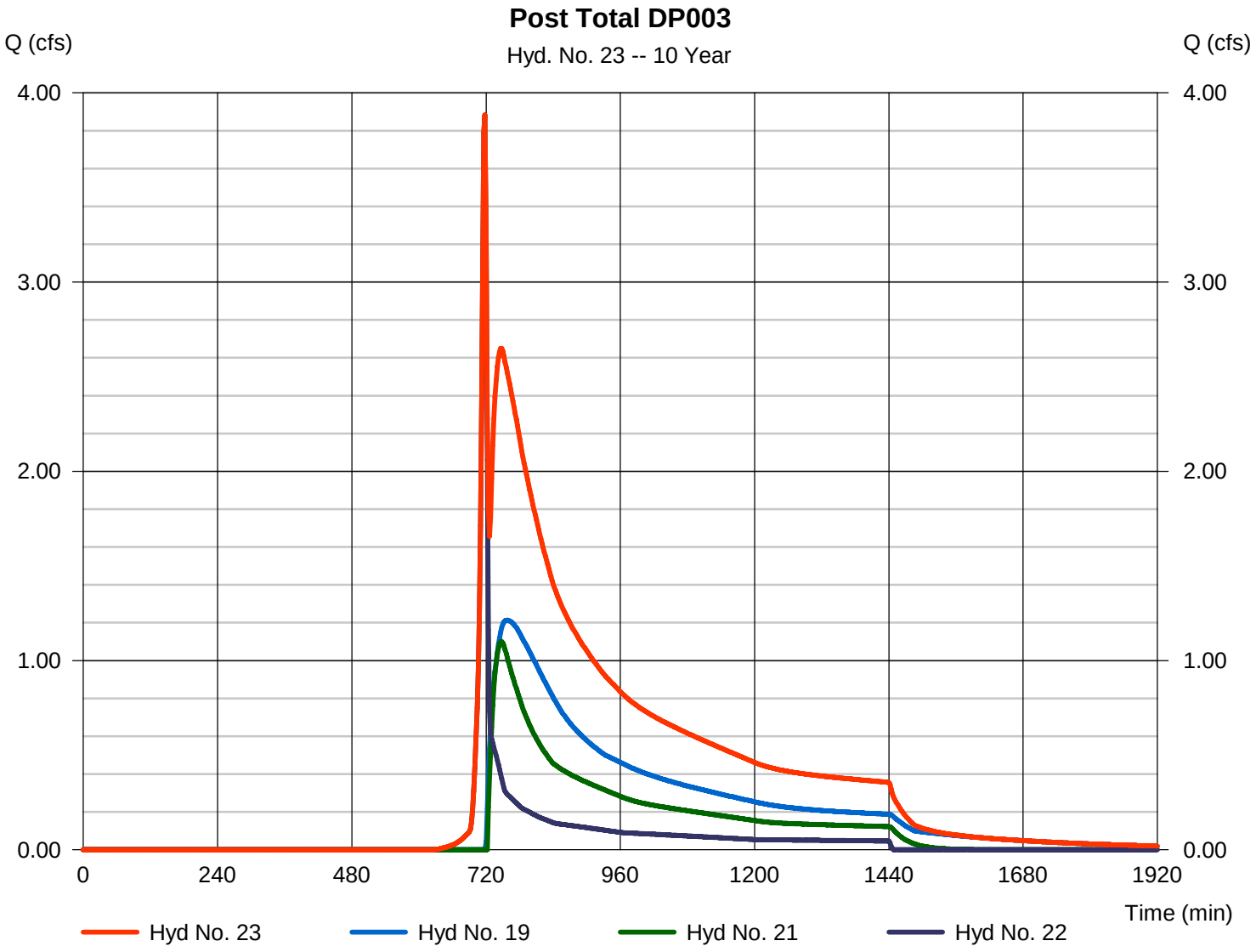


Hydrograph Report

Hyd. No. 23

Post Total DP003

Hydrograph type	=	Combine	Peak discharge	=	3.883 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	42,126 cuft
Inflow hyds.	=	19, 21, 22	Contrib. drain. area	=	1.340 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

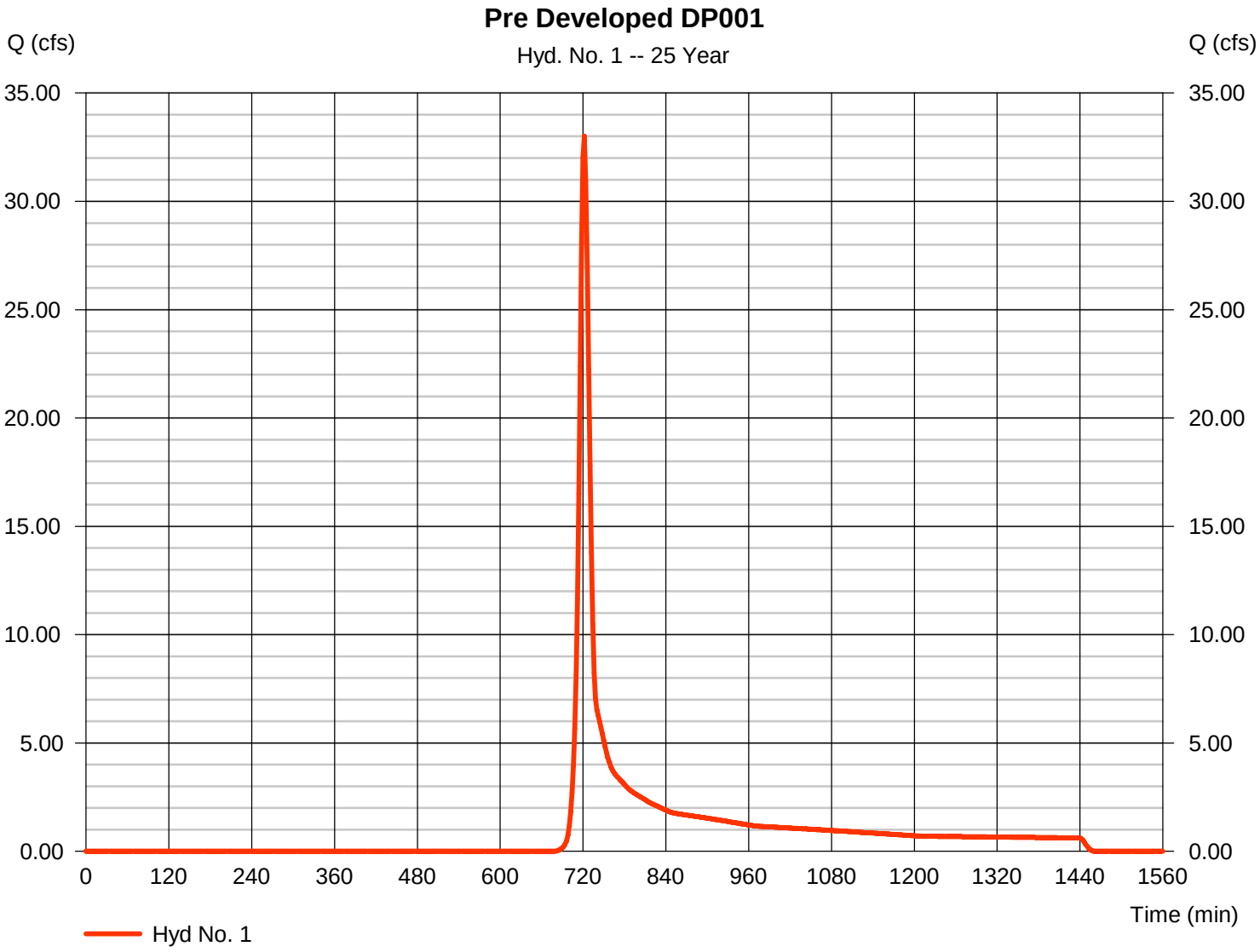
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	33.01	2	722	90,718	------	------	------	Pre Developed DP001
2	SCS Runoff	45.70	2	722	123,600	------	------	------	Pre Developed DP002
3	SCS Runoff	28.88	2	722	75,557	------	------	------	Pre Developed DP003
4	SCS Runoff	2.654	2	718	5,315	------	------	------	Pre Developed DP003 ORA
5	SCS Runoff	55.64	2	718	112,290	------	------	------	Post Basin 3
6	Reservoir	7.032	2	736	75,106	5	318.74	53,348	Basin 3 Routed
7	SCS Runoff	4.966	2	718	9,933	------	------	------	Post Bypass DP001
8	Combine	7.699	2	734	85,039	6, 7	------	------	Post Total DP001
10	SCS Runoff	51.31	2	716	103,585	------	------	------	Post Basin 1
11	Reservoir	3.633	2	756	66,096	10	323.31	54,387	Basin 1 Upper Routed
12	Reservoir	2.071	2	874	59,899	11	305.33	15,802	Basin 1 Lower Routed
13	SCS Runoff	46.02	2	716	93,362	------	------	------	Post Basin 2
14	Reservoir	5.509	2	736	61,008	13	309.83	47,406	Basin 2 Routed
15	SCS Runoff	4.826	2	718	9,678	------	------	------	Post Bypass DP002
16	Combine	6.169	2	736	130,585	12, 14, 15	------	------	Post Total DP002
18	SCS Runoff	23.48	2	716	47,598	------	------	------	Post to Basin 4
19	Reservoir	3.037	2	734	33,793	18	347.40	23,329	Basin 4 Routed
20	SCS Runoff	16.34	2	716	33,358	------	------	------	Post to Bed 1/Basin
21	Reservoir	4.714	2	724	21,261	20	341.15	16,082	UG Bed 1/Basin Routed
22	SCS Runoff	5.505	2	718	11,037	------	------	------	Post Bypass DP003
23	Combine	9.903	2	722	66,091	19, 21, 22	------	------	Post Total DP003

Hydrograph Report

Hyd. No. 1

Pre Developed DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	33.01 cfs
Storm frequency	=	25 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	90,718 cuft
Drainage area	=	15.430 ac	Curve number	=	57.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



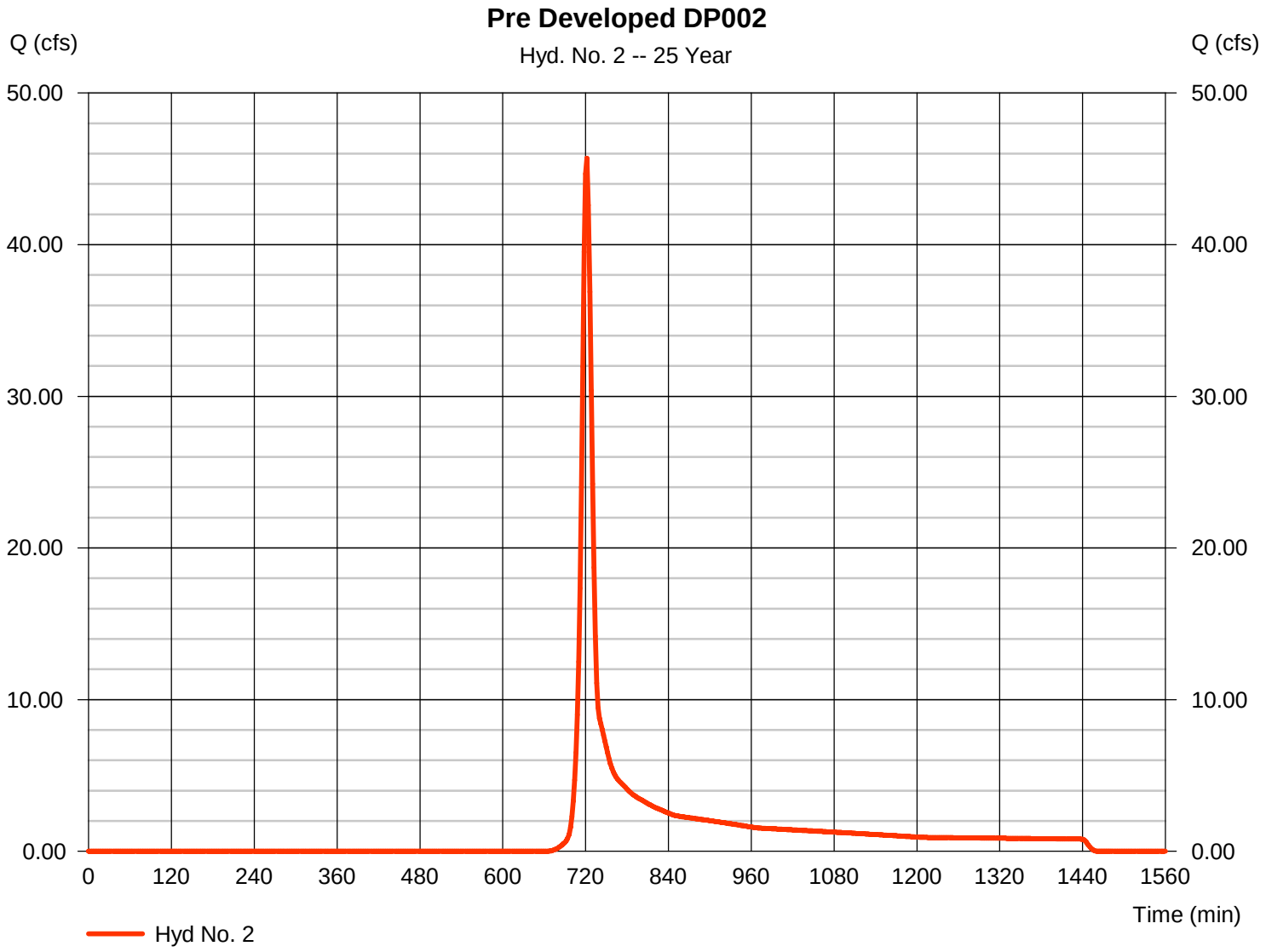
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 13 / 2023

Hyd. No. 2

Pre Developed DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	45.70 cfs
Storm frequency	=	25 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	123,600 cuft
Drainage area	=	19.210 ac	Curve number	=	59.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



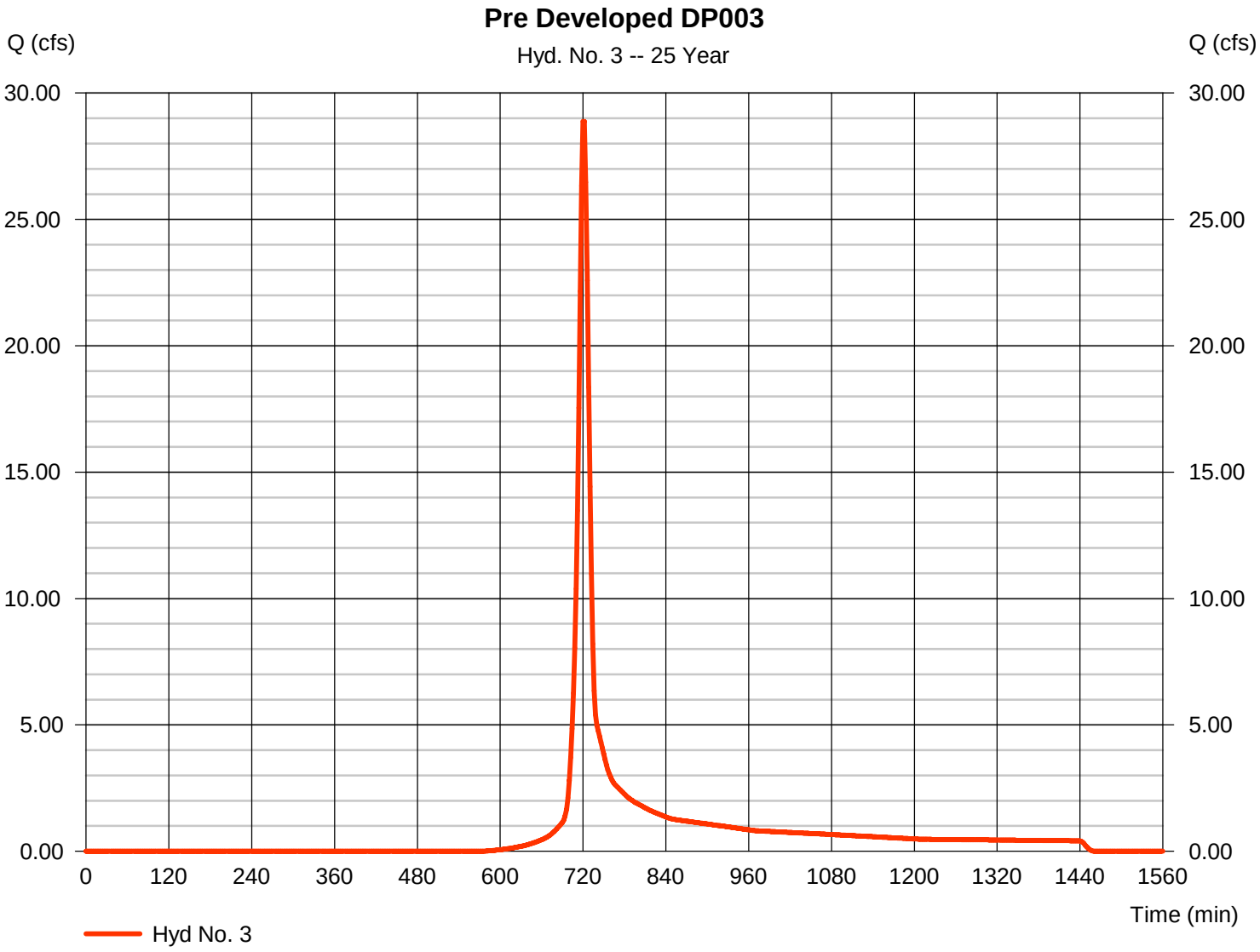
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 13 / 2023

Hyd. No. 3

Pre Developed DP003

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.88 cfs
Storm frequency	=	25 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	75,557 cuft
Drainage area	=	8.190 ac	Curve number	=	68.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



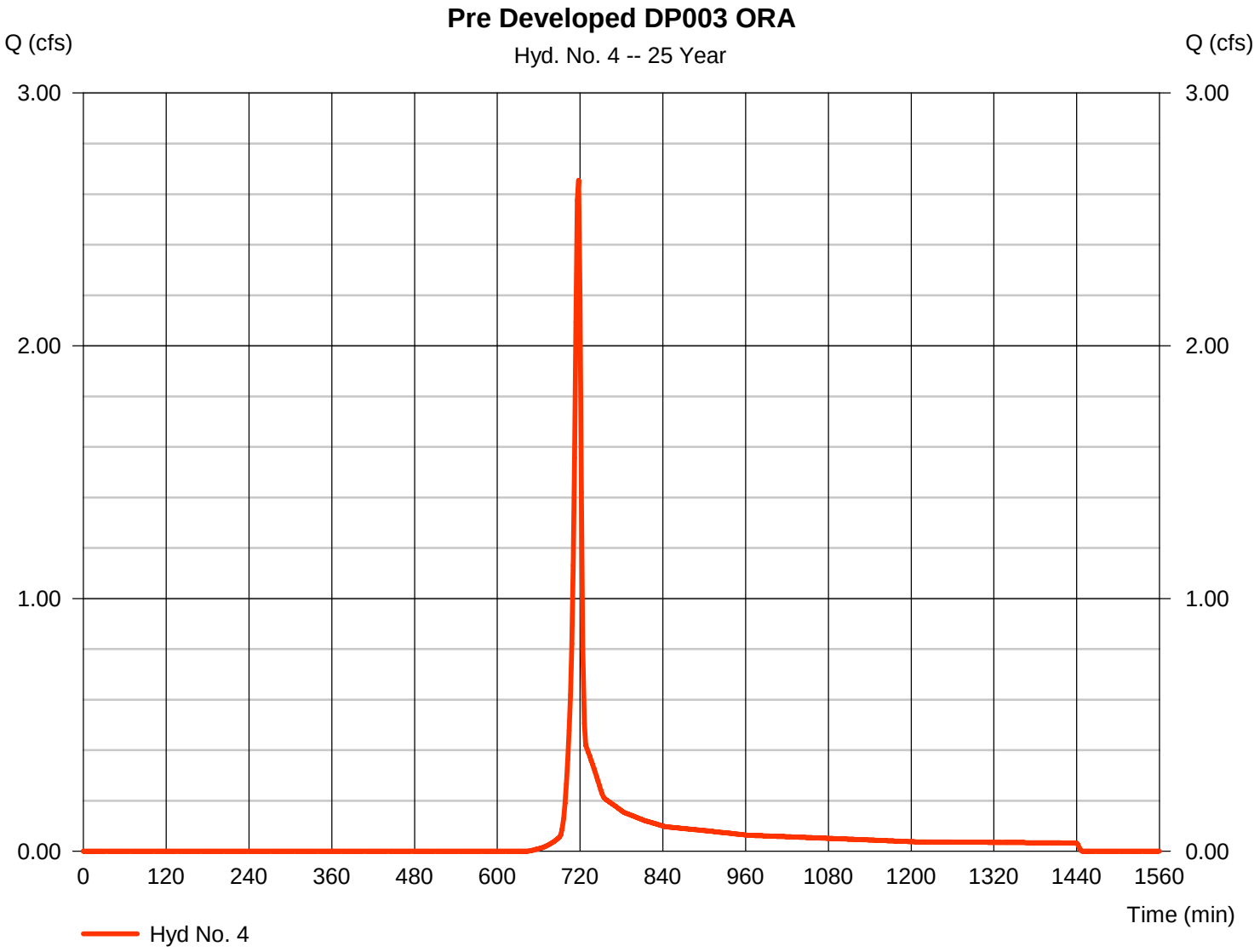
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 13 / 2023

Hyd. No. 4

Pre Developed DP003 ORA

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.654 cfs
Storm frequency	=	25 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	5,315 cuft
Drainage area	=	0.810 ac	Curve number	=	62
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

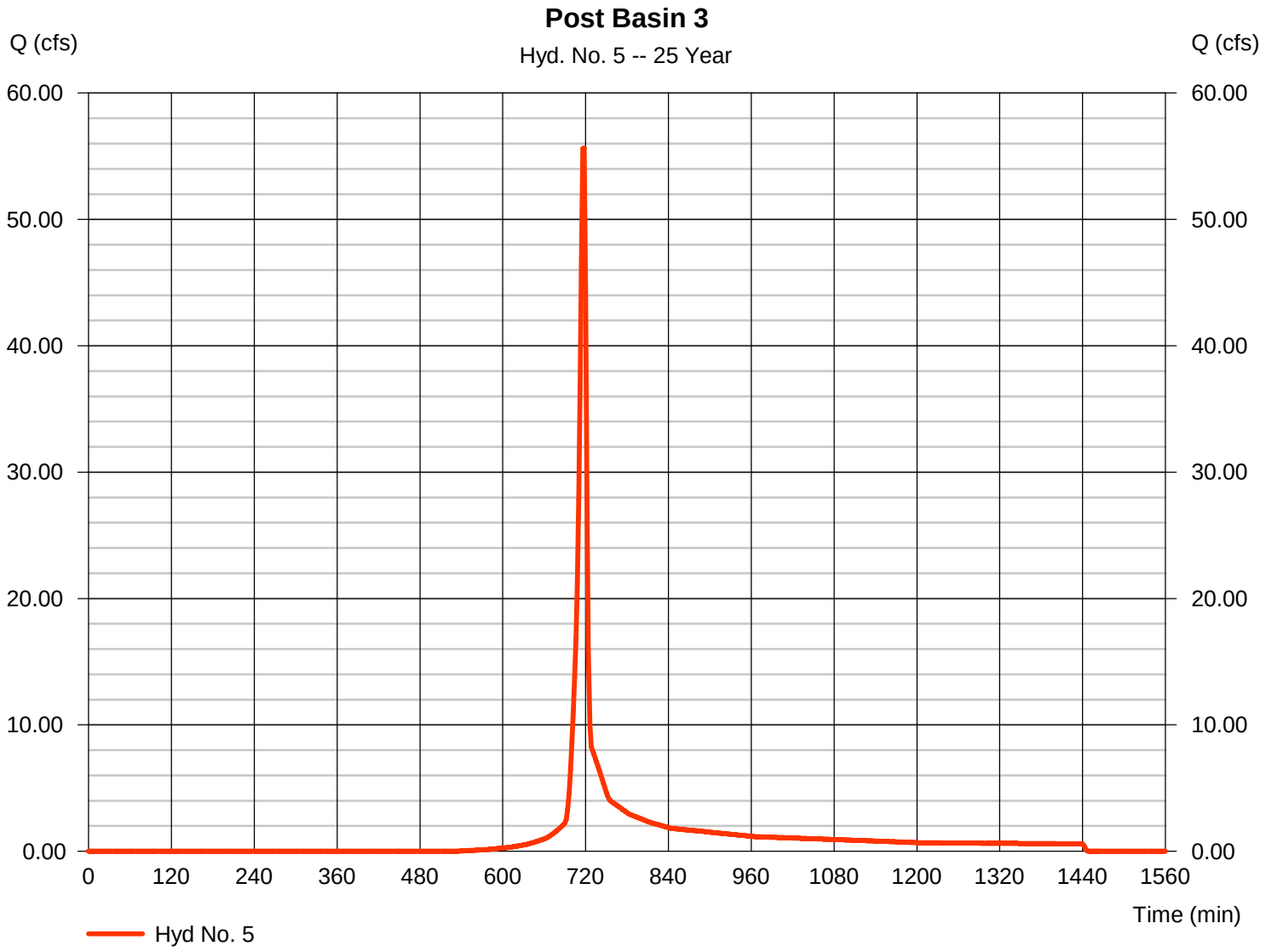


Hydrograph Report

Hyd. No. 5

Post Basin 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	55.64 cfs
Storm frequency	=	25 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	112,290 cuft
Drainage area	=	12.150 ac	Curve number	=	71.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



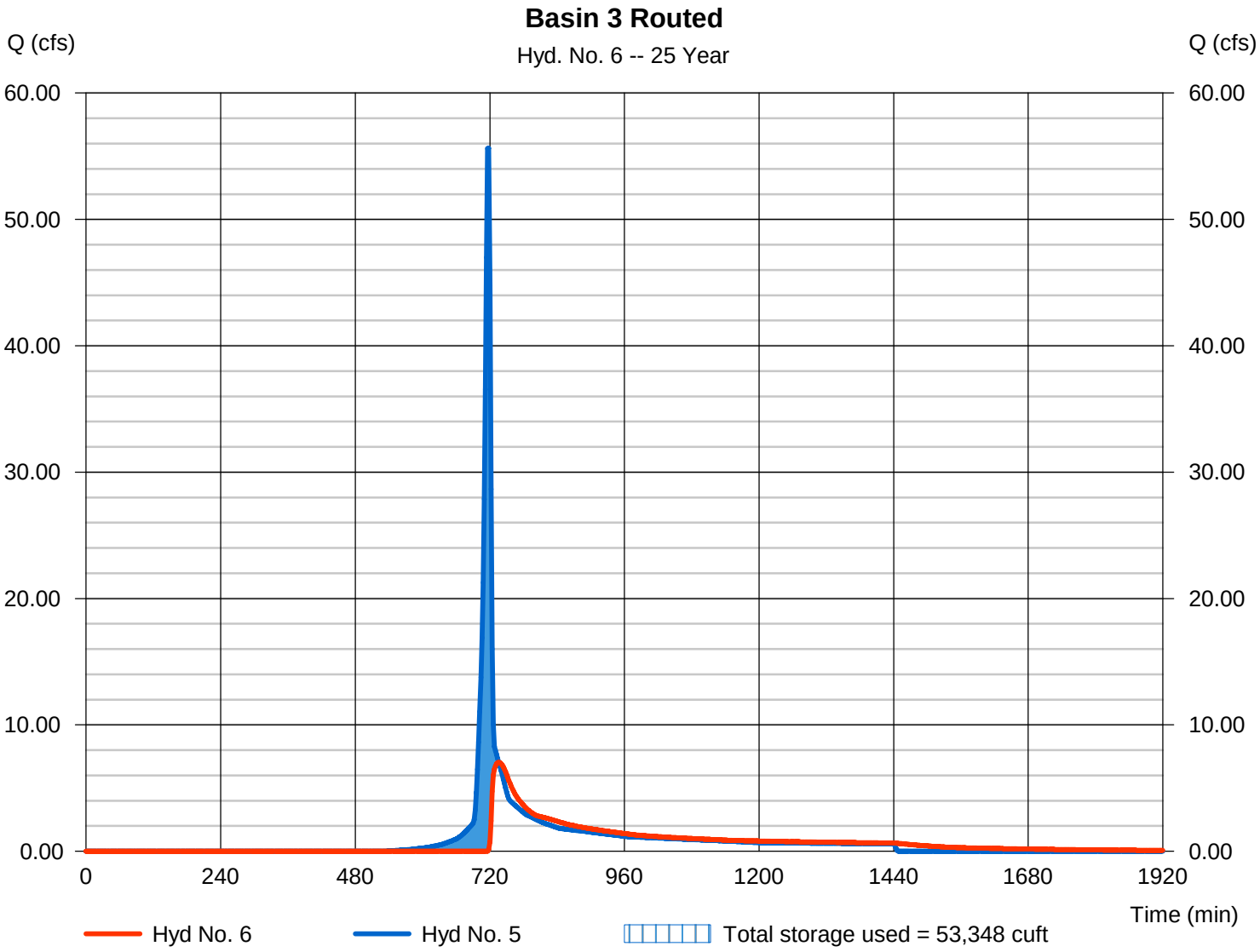
Hydrograph Report

Hyd. No. 6

Basin 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	7.032 cfs
Storm frequency	=	25 yrs	Time to peak	=	736 min
Time interval	=	2 min	Hyd. volume	=	75,106 cuft
Inflow hyd. No.	=	5 - Post Basin 3	Max. Elevation	=	318.74 ft
Reservoir name	=	Basin 3	Max. Storage	=	53,348 cuft

Storage Indication method used.

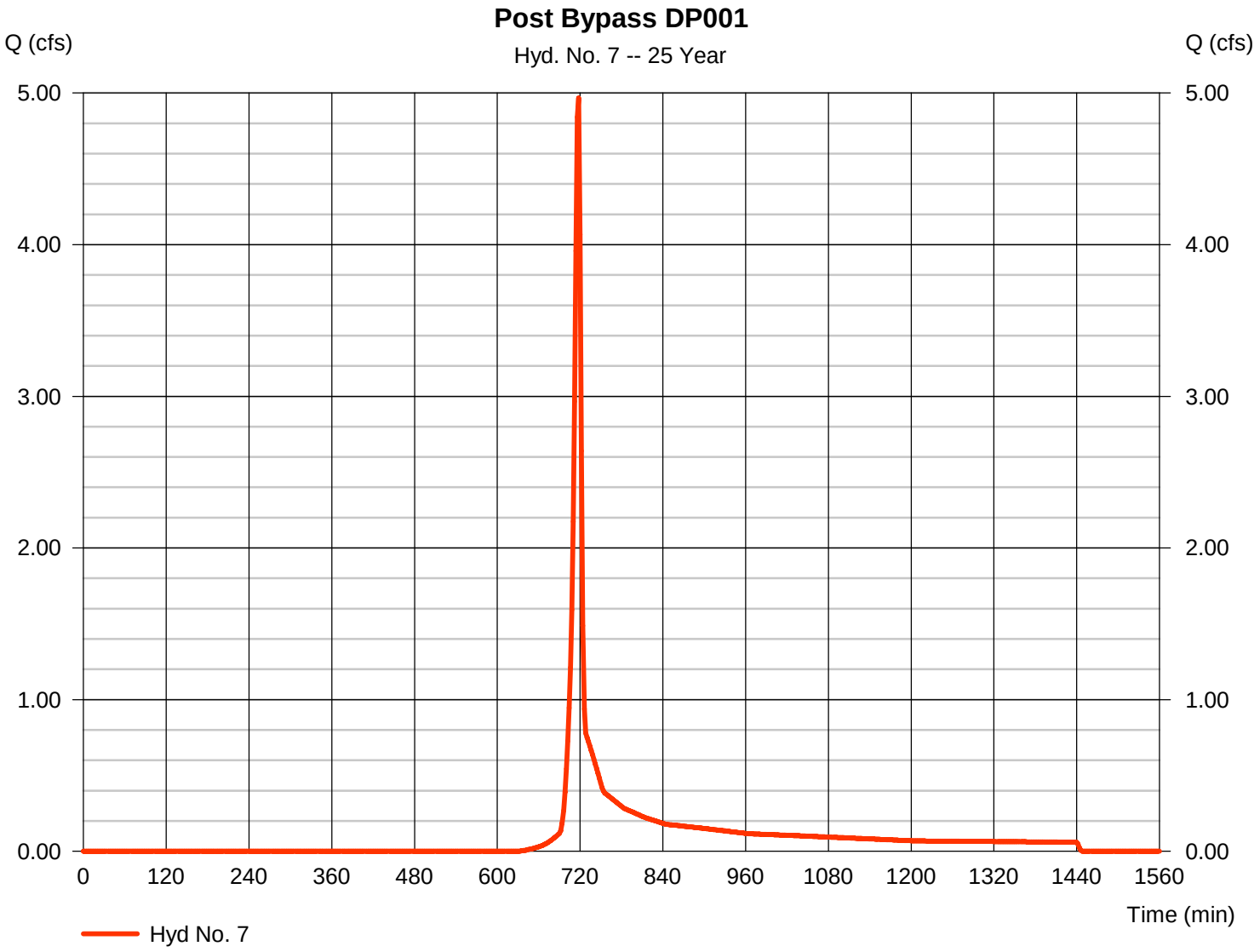


Hydrograph Report

Hyd. No. 7

Post Bypass DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.966 cfs
Storm frequency	=	25 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	9,933 cuft
Drainage area	=	1.440 ac	Curve number	=	63.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

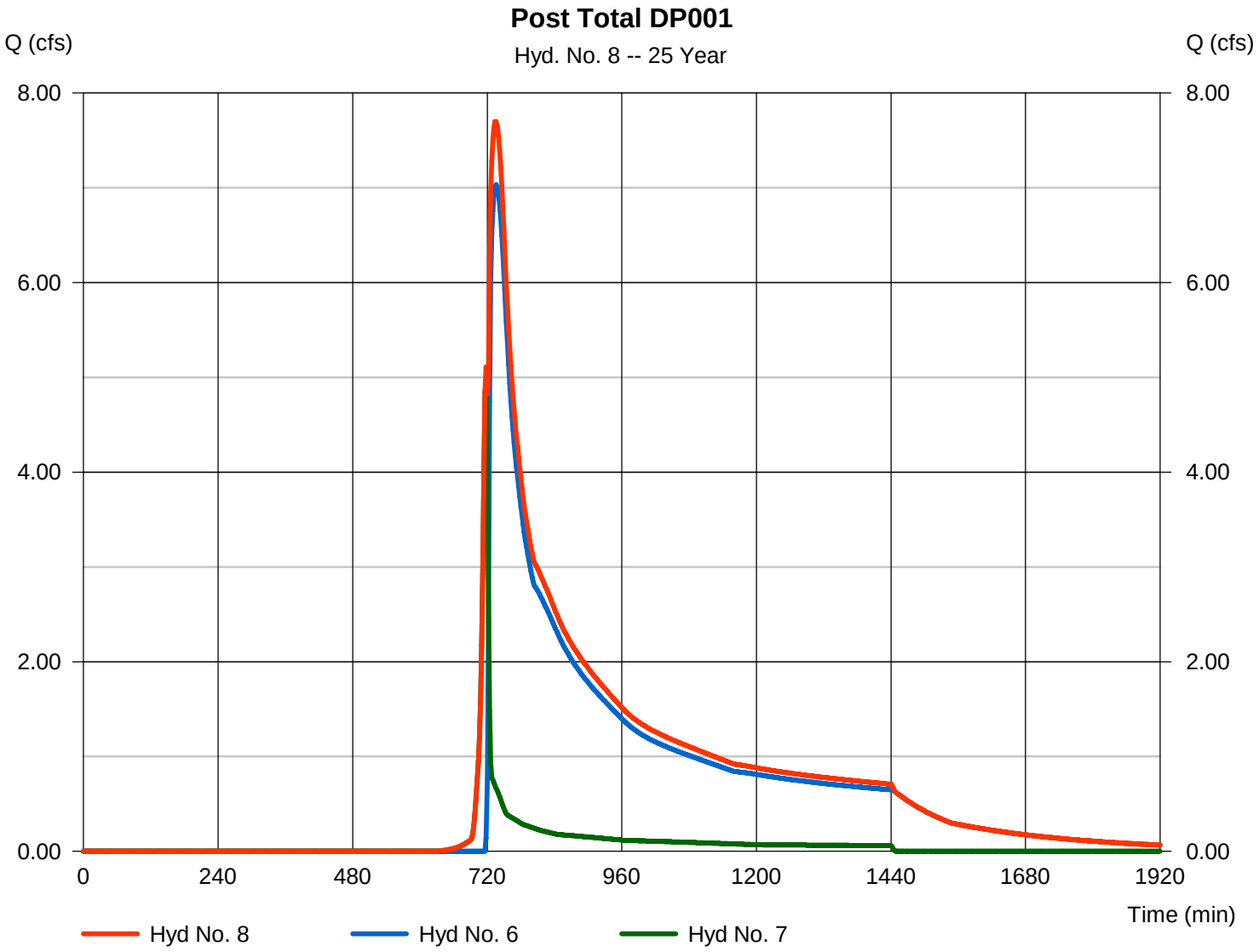


Hydrograph Report

Hyd. No. 8

Post Total DP001

Hydrograph type	= Combine	Peak discharge	= 7.699 cfs
Storm frequency	= 25 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 85,039 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.440 ac

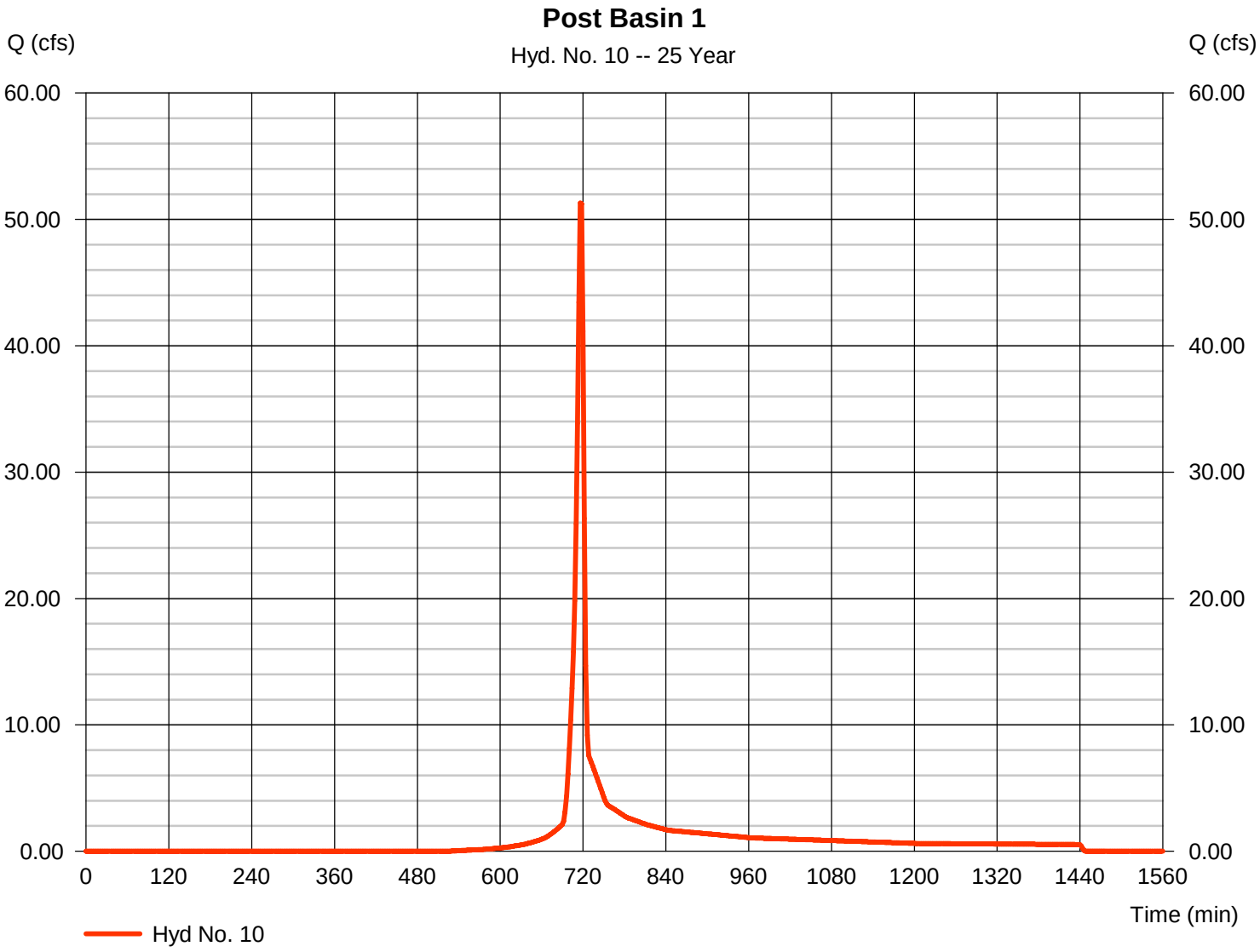


Hydrograph Report

Hyd. No. 10

Post Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	51.31 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	103,585 cuft
Drainage area	=	10.950 ac	Curve number	=	71.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



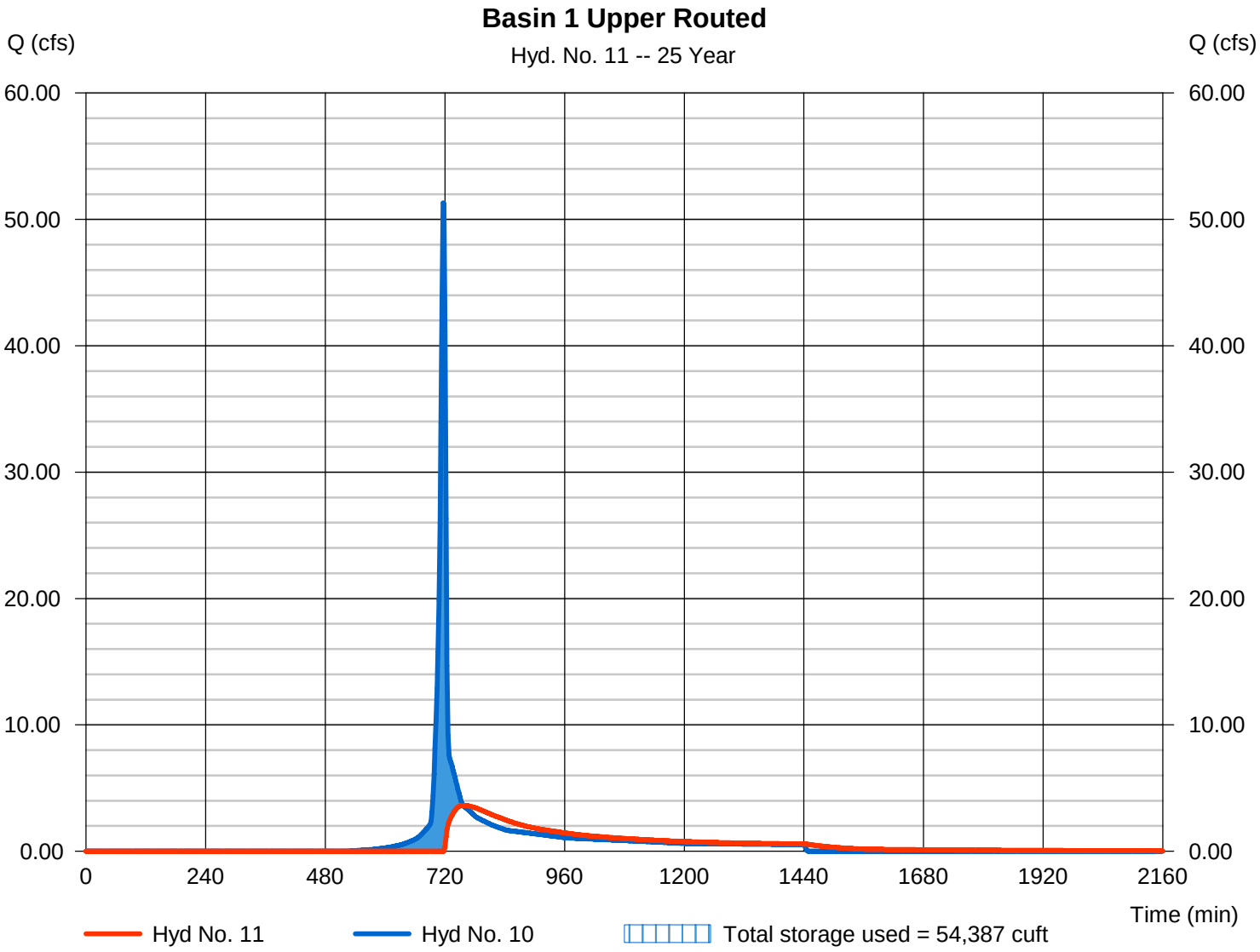
Hydrograph Report

Hyd. No. 11

Basin 1 Upper Routed

Hydrograph type	=	Reservoir	Peak discharge	=	3.633 cfs
Storm frequency	=	25 yrs	Time to peak	=	756 min
Time interval	=	2 min	Hyd. volume	=	66,096 cuft
Inflow hyd. No.	=	10 - Post Basin 1	Max. Elevation	=	323.31 ft
Reservoir name	=	Basin 1 Upper	Max. Storage	=	54,387 cuft

Storage Indication method used.



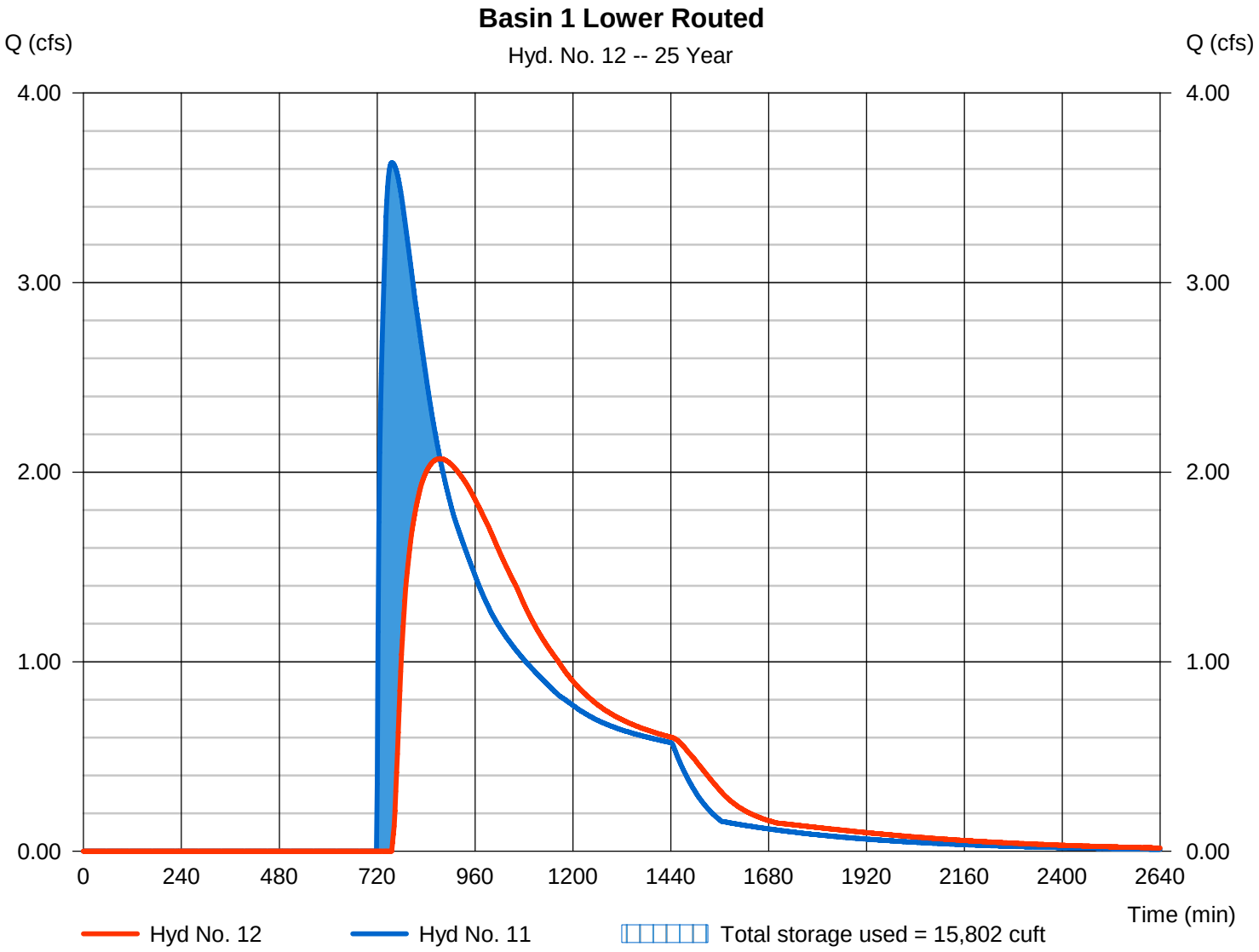
Hydrograph Report

Hyd. No. 12

Basin 1 Lower Routed

Hydrograph type	=	Reservoir	Peak discharge	=	2.071 cfs
Storm frequency	=	25 yrs	Time to peak	=	874 min
Time interval	=	2 min	Hyd. volume	=	59,899 cuft
Inflow hyd. No.	=	11 - Basin 1 Upper Routed	Max. Elevation	=	305.33 ft
Reservoir name	=	Basin 1 Lower	Max. Storage	=	15,802 cuft

Storage Indication method used.

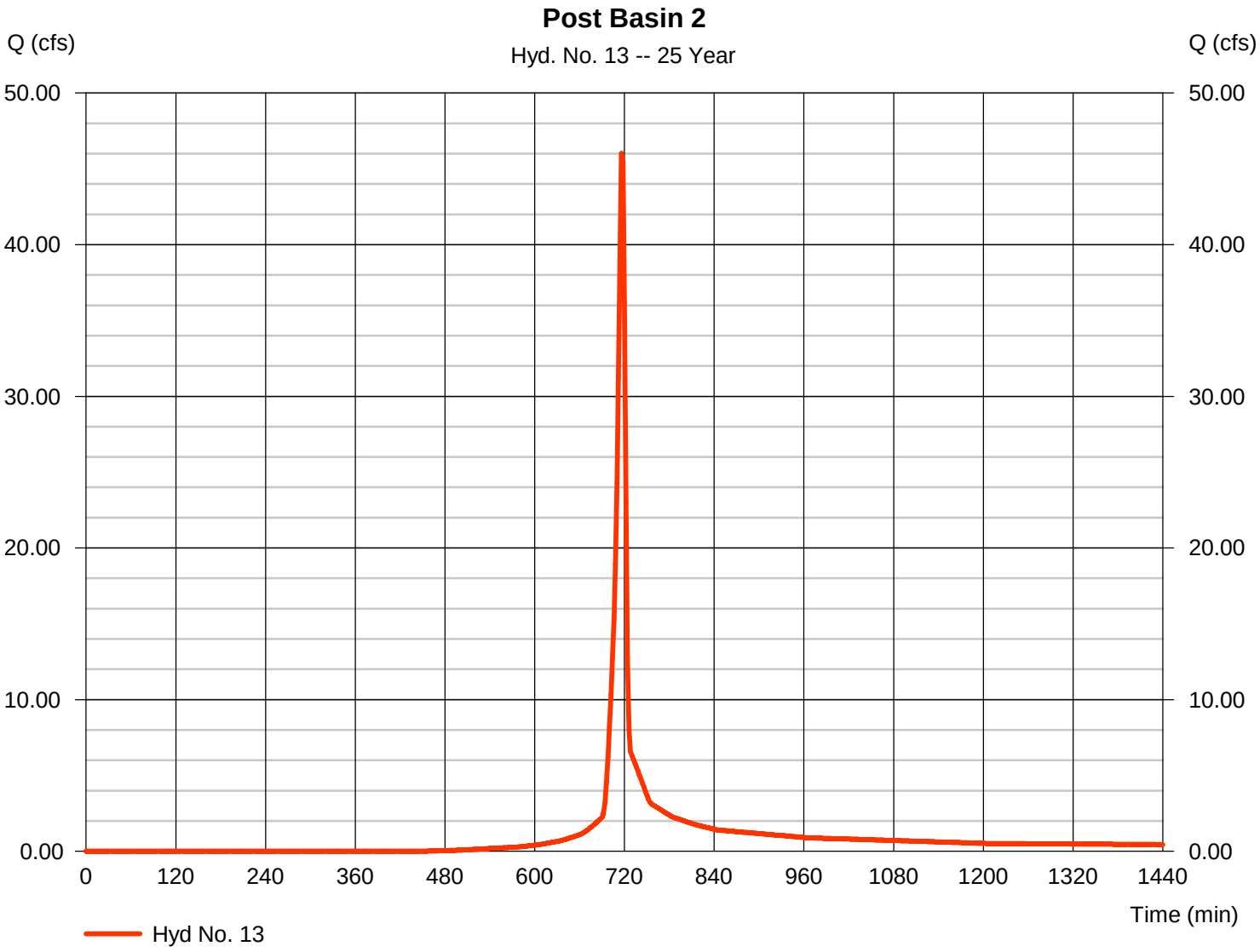


Hydrograph Report

Hyd. No. 13

Post Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	46.02 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	93,362 cuft
Drainage area	=	8.540 ac	Curve number	=	76.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



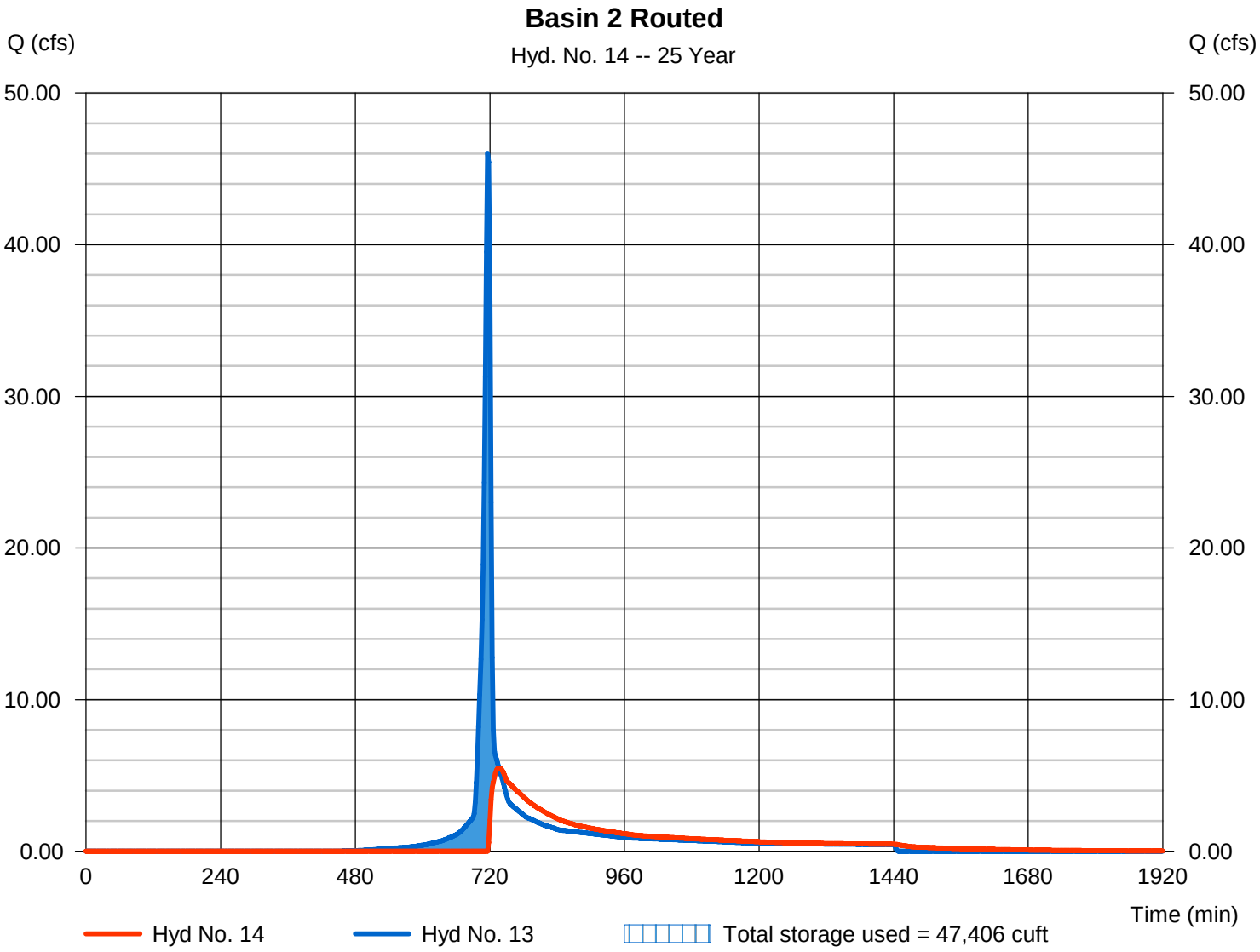
Hydrograph Report

Hyd. No. 14

Basin 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	5.509 cfs
Storm frequency	=	25 yrs	Time to peak	=	736 min
Time interval	=	2 min	Hyd. volume	=	61,008 cuft
Inflow hyd. No.	=	13 - Post Basin 2	Max. Elevation	=	309.83 ft
Reservoir name	=	Basin 2	Max. Storage	=	47,406 cuft

Storage Indication method used.

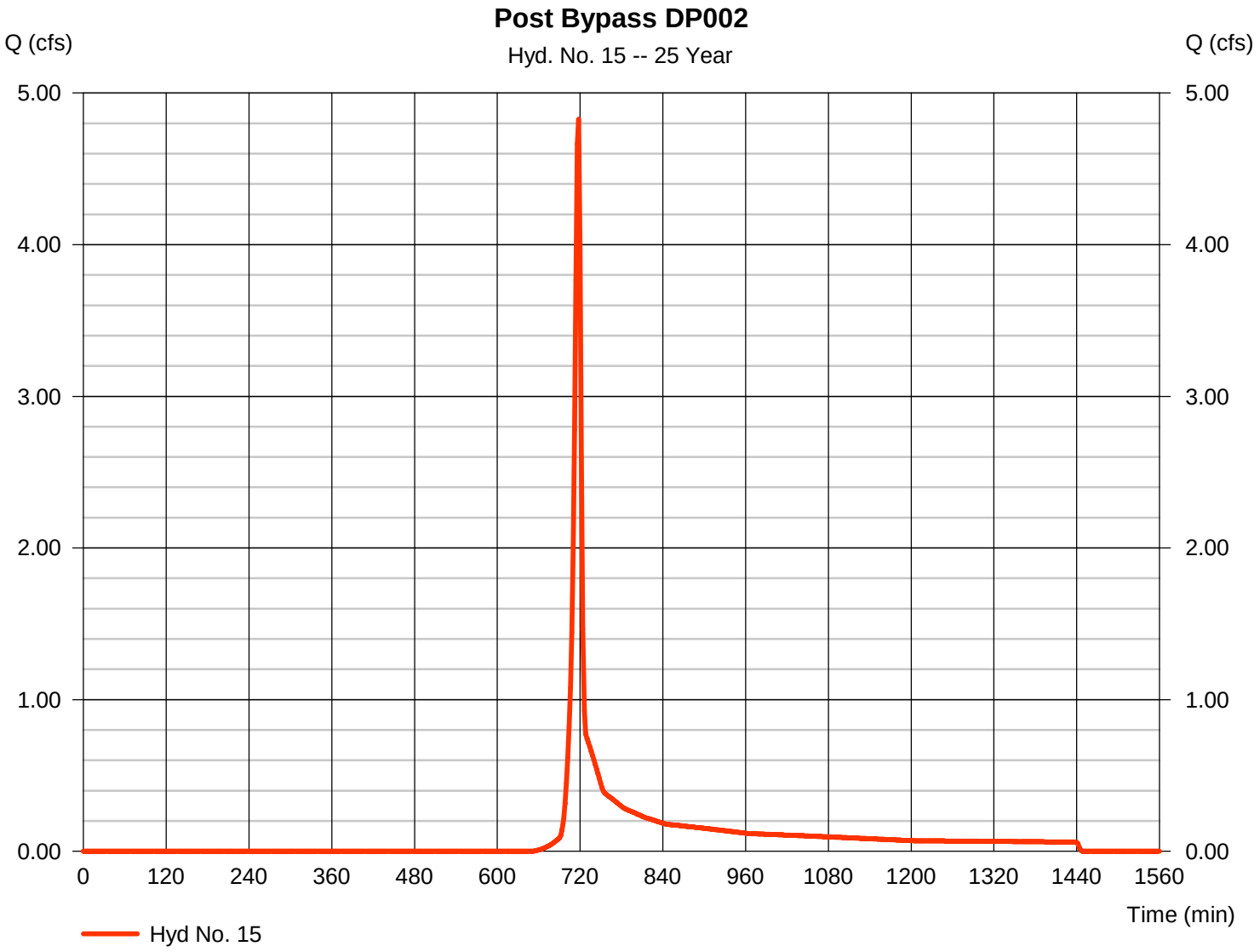


Hydrograph Report

Hyd. No. 15

Post Bypass DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.826 cfs
Storm frequency	=	25 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	9,678 cuft
Drainage area	=	1.540 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

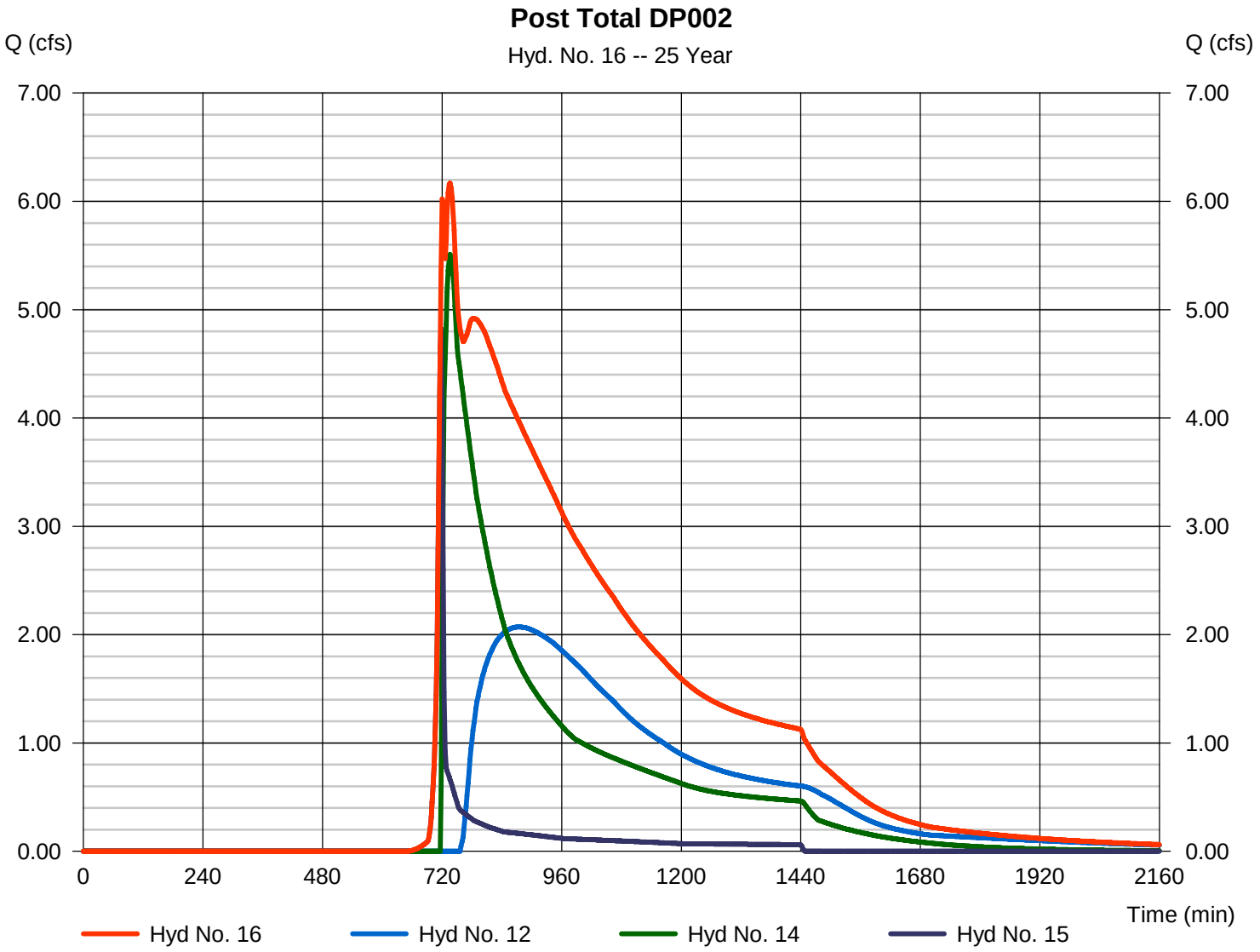


Hydrograph Report

Hyd. No. 16

Post Total DP002

Hydrograph type	=	Combine	Peak discharge	=	6.169 cfs
Storm frequency	=	25 yrs	Time to peak	=	736 min
Time interval	=	2 min	Hyd. volume	=	130,585 cuft
Inflow hyds.	=	12, 14, 15	Contrib. drain. area	=	1.540 ac



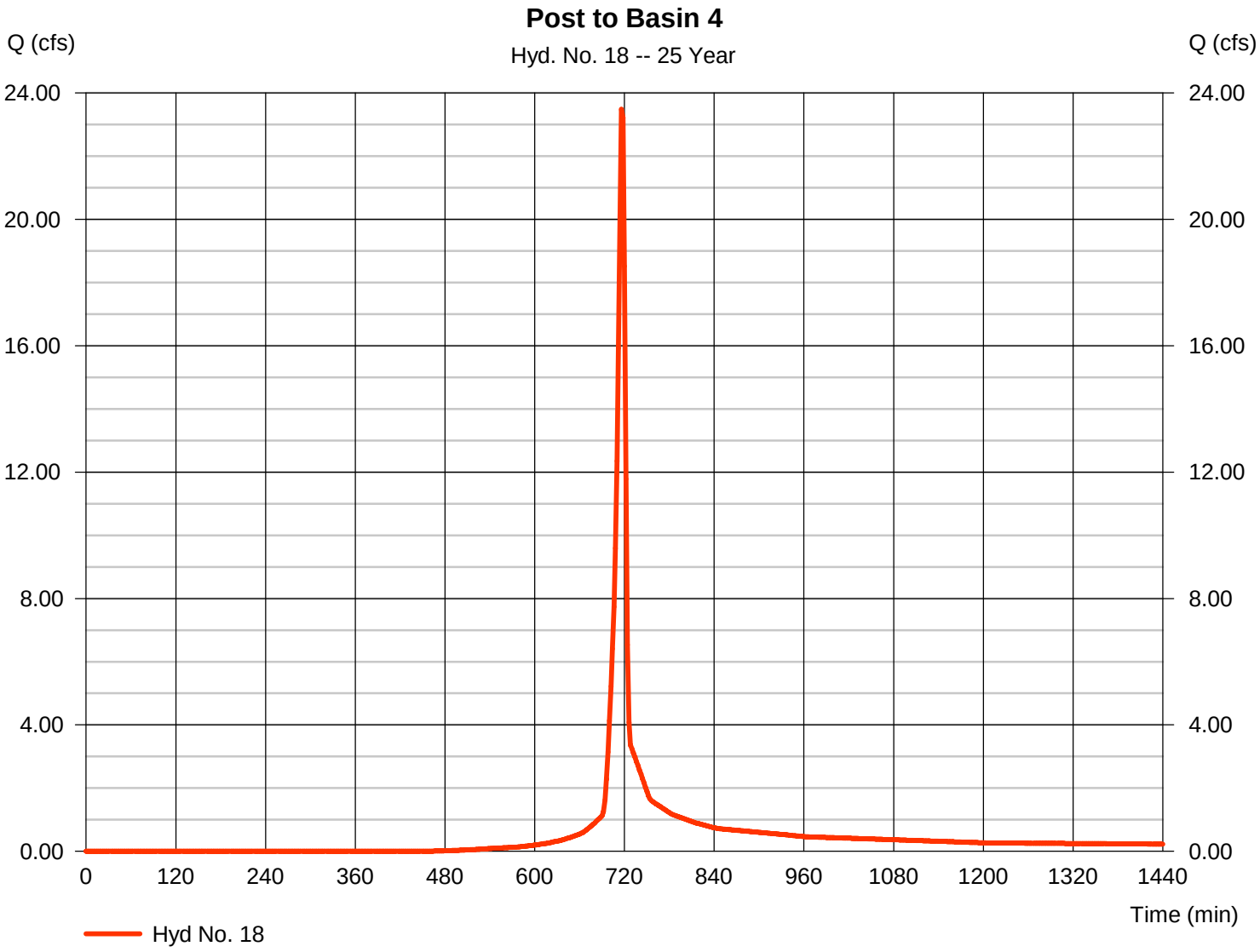
Hydrograph Report

Hyd. No. 18

Post to Basin 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	23.48 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	47,598 cuft
Drainage area	=	4.420 ac	Curve number	=	75.9*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.910 x 61) + (2.270 x 98) + (3.040 x 78)] / 4.420



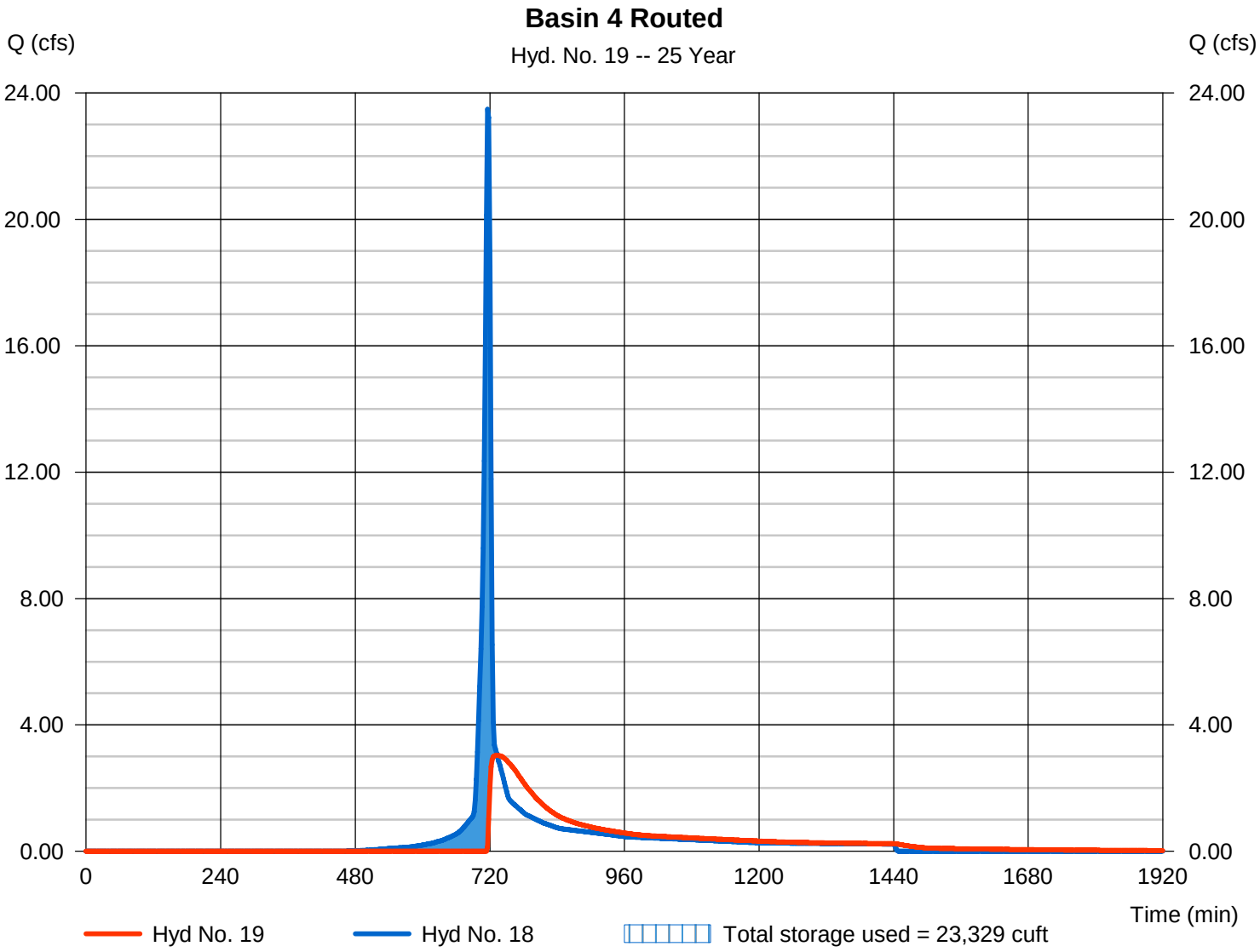
Hydrograph Report

Hyd. No. 19

Basin 4 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	3.037 cfs
Storm frequency	=	25 yrs	Time to peak	=	734 min
Time interval	=	2 min	Hyd. volume	=	33,793 cuft
Inflow hyd. No.	=	18 - Post to Basin 4	Max. Elevation	=	347.40 ft
Reservoir name	=	Basin 4	Max. Storage	=	23,329 cuft

Storage Indication method used.



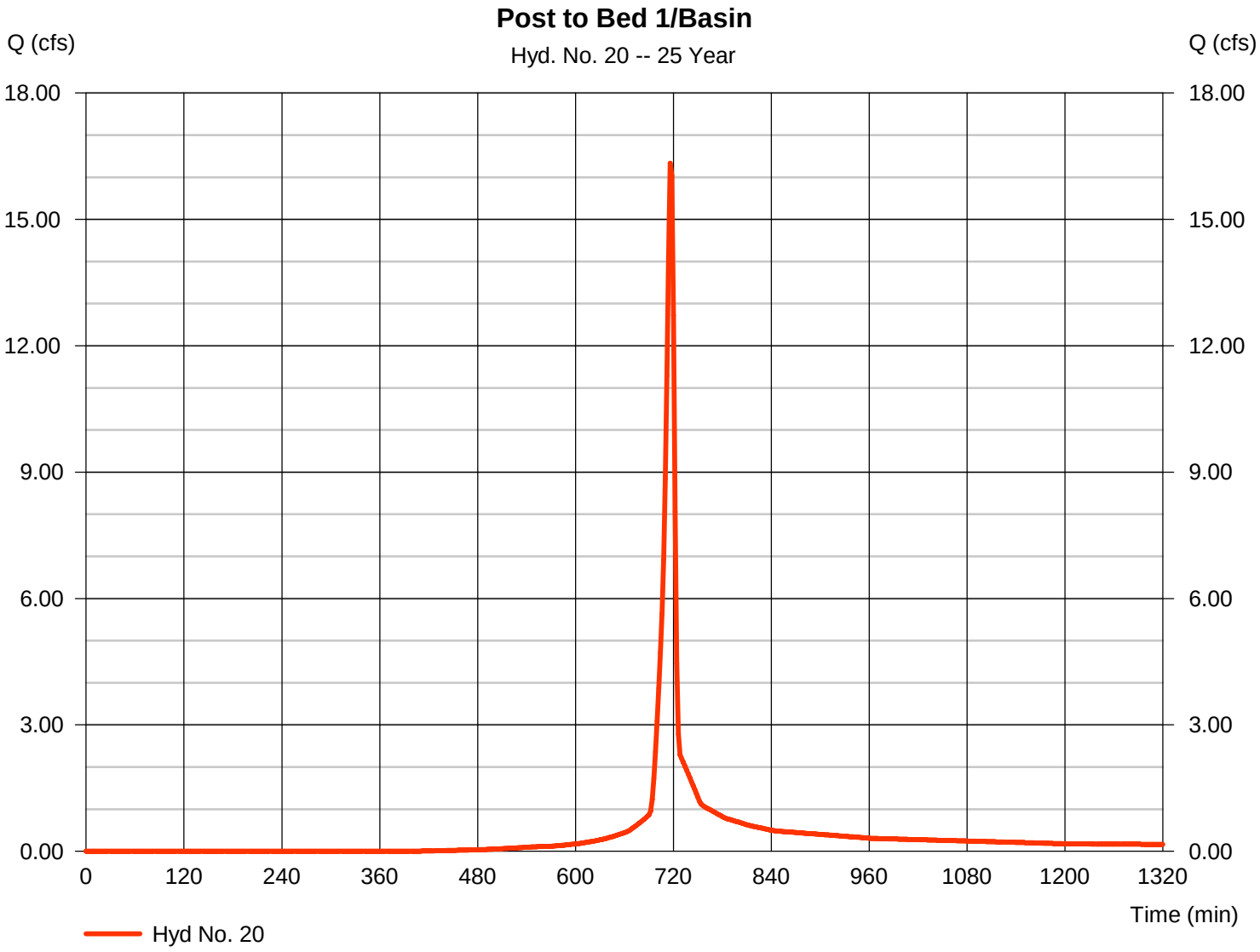
Hydrograph Report

Hyd. No. 20

Post to Bed 1/Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	16.34 cfs
Storm frequency	=	25 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	33,358 cuft
Drainage area	=	2.820 ac	Curve number	=	79.1*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.910 x 61) + (2.270 x 98) + (3.040 x 78)] / 2.820



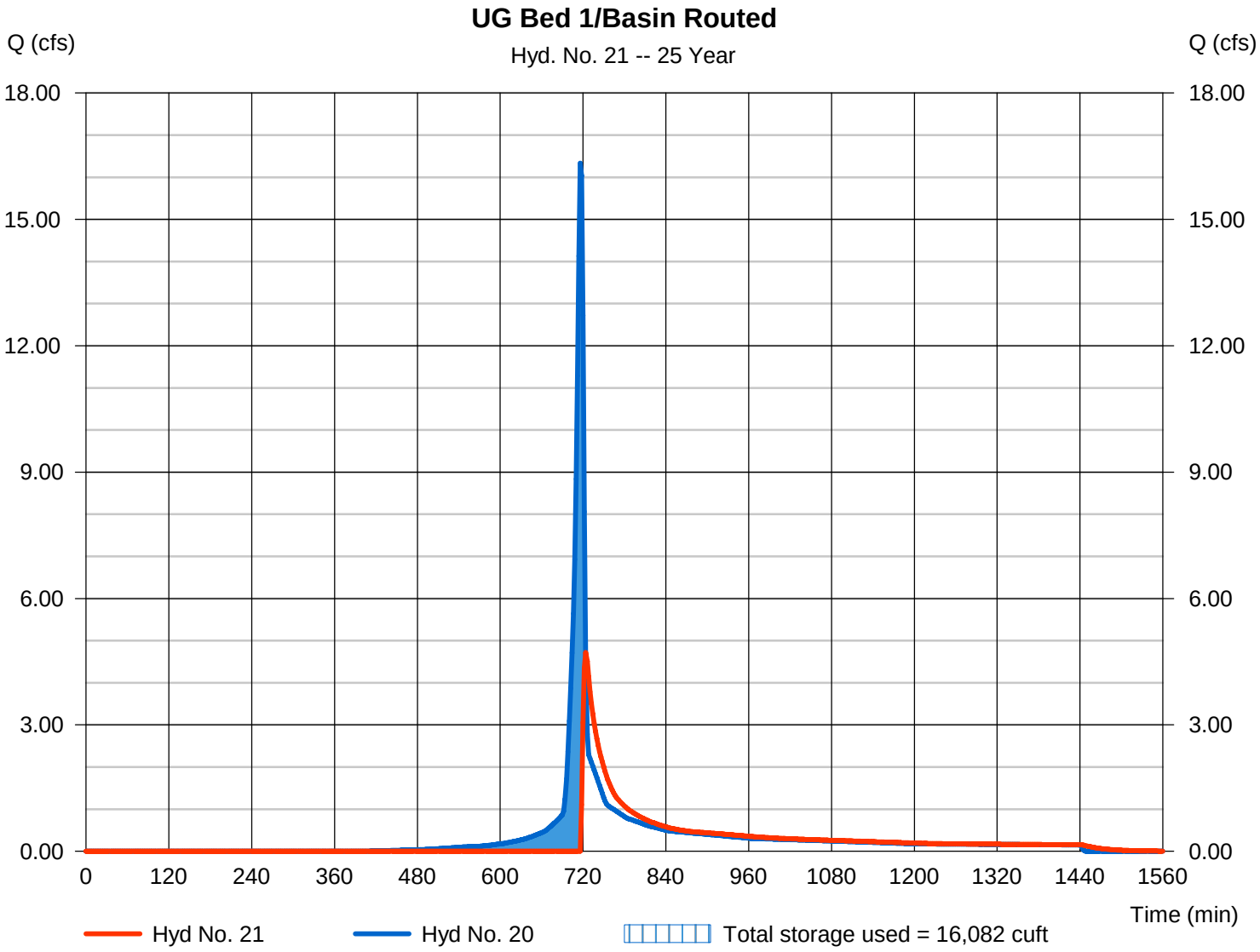
Hydrograph Report

Hyd. No. 21

UG Bed 1/Basin Routed

Hydrograph type	=	Reservoir	Peak discharge	=	4.714 cfs
Storm frequency	=	25 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	21,261 cuft
Inflow hyd. No.	=	20 - Post to Bed 1/Basin	Max. Elevation	=	341.15 ft
Reservoir name	=	UG Bed 1/Basin	Max. Storage	=	16,082 cuft

Storage Indication method used.

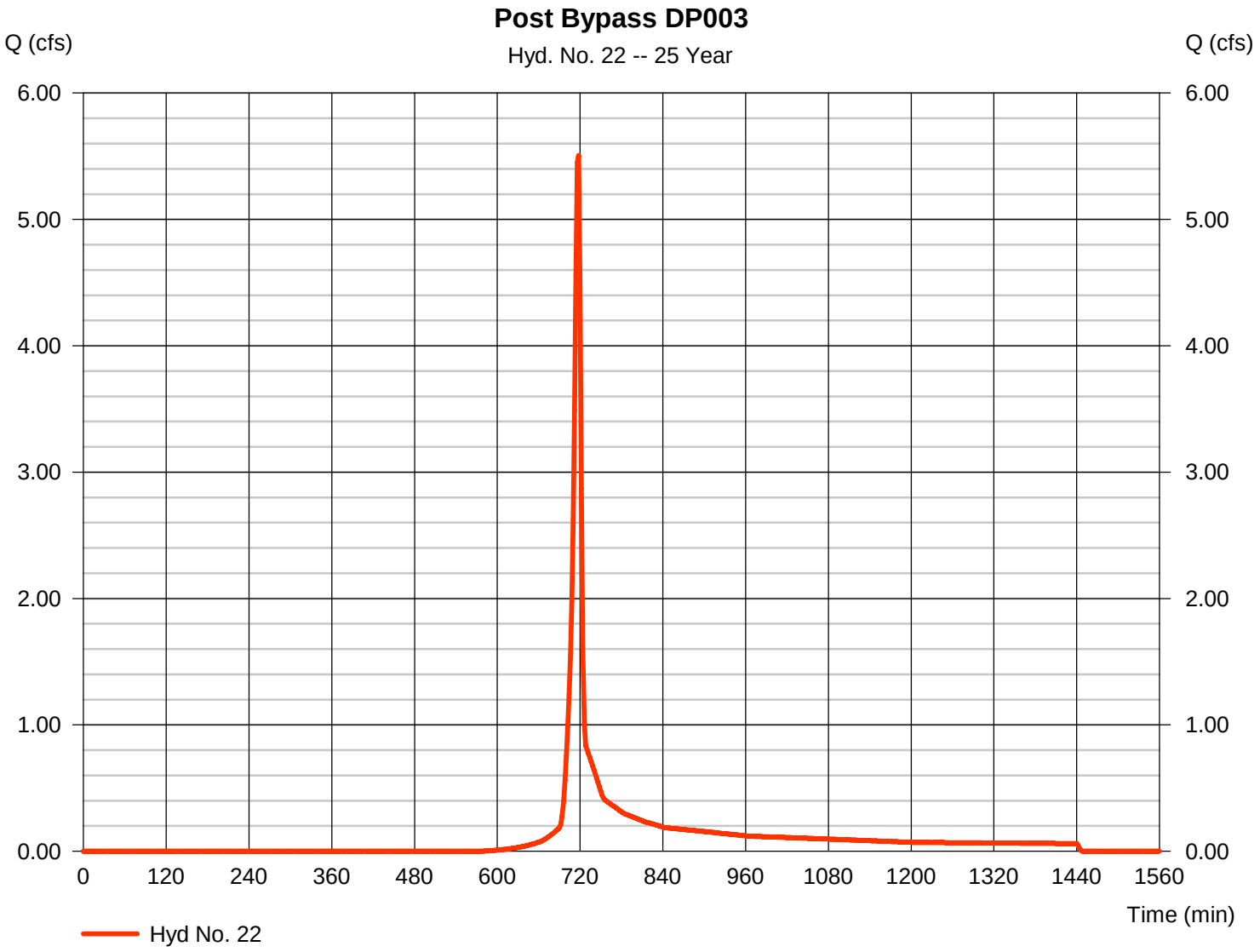


Hydrograph Report

Hyd. No. 22

Post Bypass DP003

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.505 cfs
Storm frequency	=	25 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	11,037 cuft
Drainage area	=	1.340 ac	Curve number	=	67.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.76 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

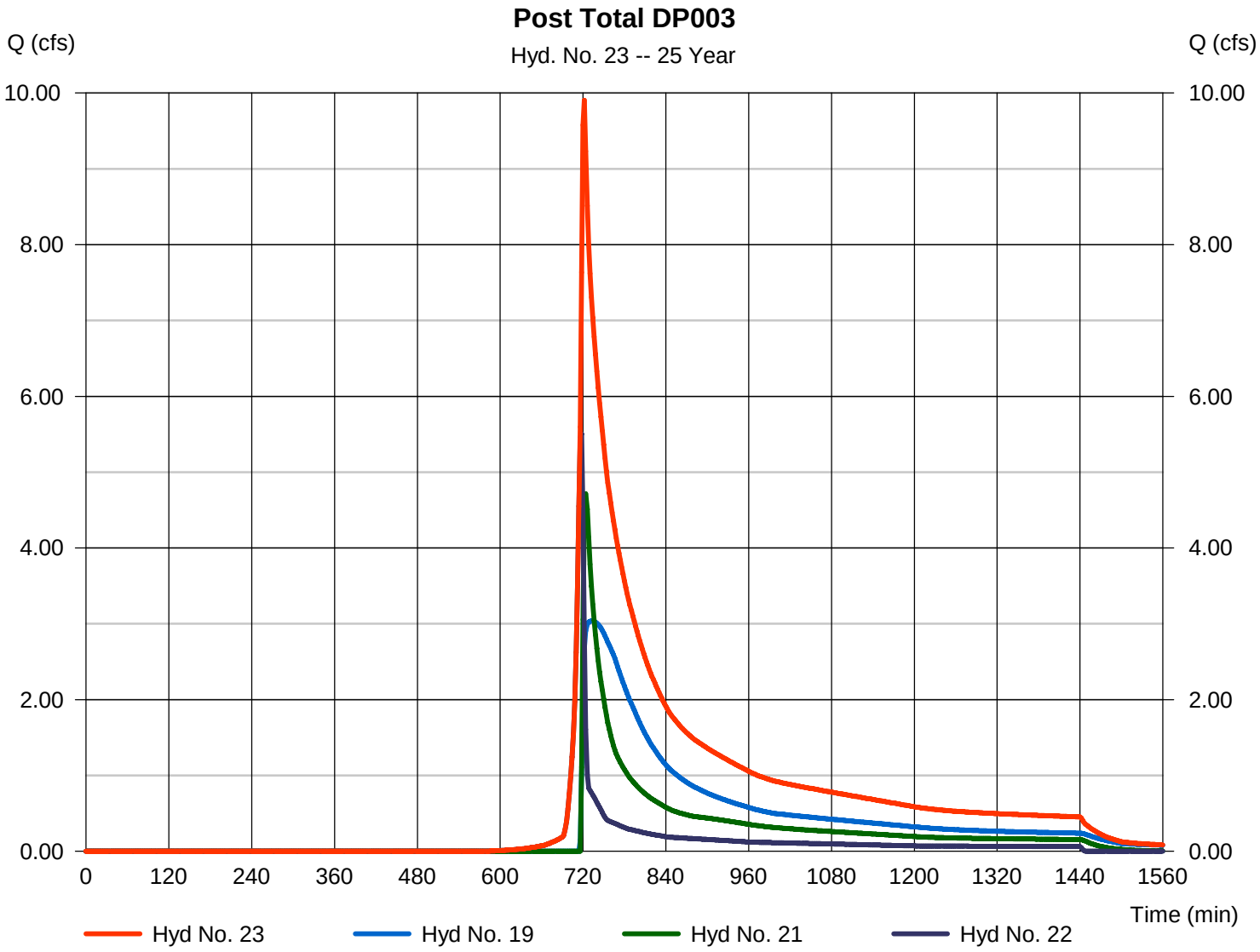


Hydrograph Report

Hyd. No. 23

Post Total DP003

Hydrograph type	= Combine	Peak discharge	= 9.903 cfs
Storm frequency	= 25 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 66,091 cuft
Inflow hyds.	= 19, 21, 22	Contrib. drain. area	= 1.340 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	45.18	2	722	121,090	------	------	------	Pre Developed DP001
2	SCS Runoff	61.46	2	722	163,179	------	------	------	Pre Developed DP002
3	SCS Runoff	36.78	2	720	95,632	------	------	------	Pre Developed DP003
4	SCS Runoff	3.460	2	718	6,921	------	------	------	Pre Developed DP003 ORA
5	SCS Runoff	69.54	2	716	140,558	------	------	------	Post Basin 3
6	Reservoir	20.11	2	724	103,374	5	319.14	62,264	Basin 3 Routed
7	SCS Runoff	6.425	2	718	12,860	------	------	------	Post Bypass DP001
8	Combine	22.70	2	722	116,234	6, 7	------	------	Post Total DP001
10	SCS Runoff	63.94	2	716	129,319	------	------	------	Post Basin 1
11	Reservoir	10.69	2	726	91,830	10	323.71	61,860	Basin 1 Upper Routed
12	Reservoir	5.226	2	772	85,633	11	305.66	18,217	Basin 1 Lower Routed
13	SCS Runoff	56.20	2	716	114,655	------	------	------	Post Basin 2
14	Reservoir	18.98	2	724	82,300	13	310.22	53,973	Basin 2 Routed
15	SCS Runoff	6.335	2	718	12,668	------	------	------	Post Bypass DP002
16	Combine	21.32	2	722	180,602	12, 14, 15	------	------	Post Total DP002
18	SCS Runoff	28.74	2	716	58,554	------	------	------	Post to Basin 4
19	Reservoir	4.304	2	728	44,749	18	348.05	28,657	Basin 4 Routed
20	SCS Runoff	19.73	2	716	40,599	------	------	------	Post to Bed 1/Basin
21	Reservoir	7.370	2	724	28,502	20	341.74	18,600	UG Bed 1/Basin Routed
22	SCS Runoff	6.944	2	718	13,999	------	------	------	Post Bypass DP003
23	Combine	16.09	2	720	87,250	19, 21, 22	------	------	Post Total DP003

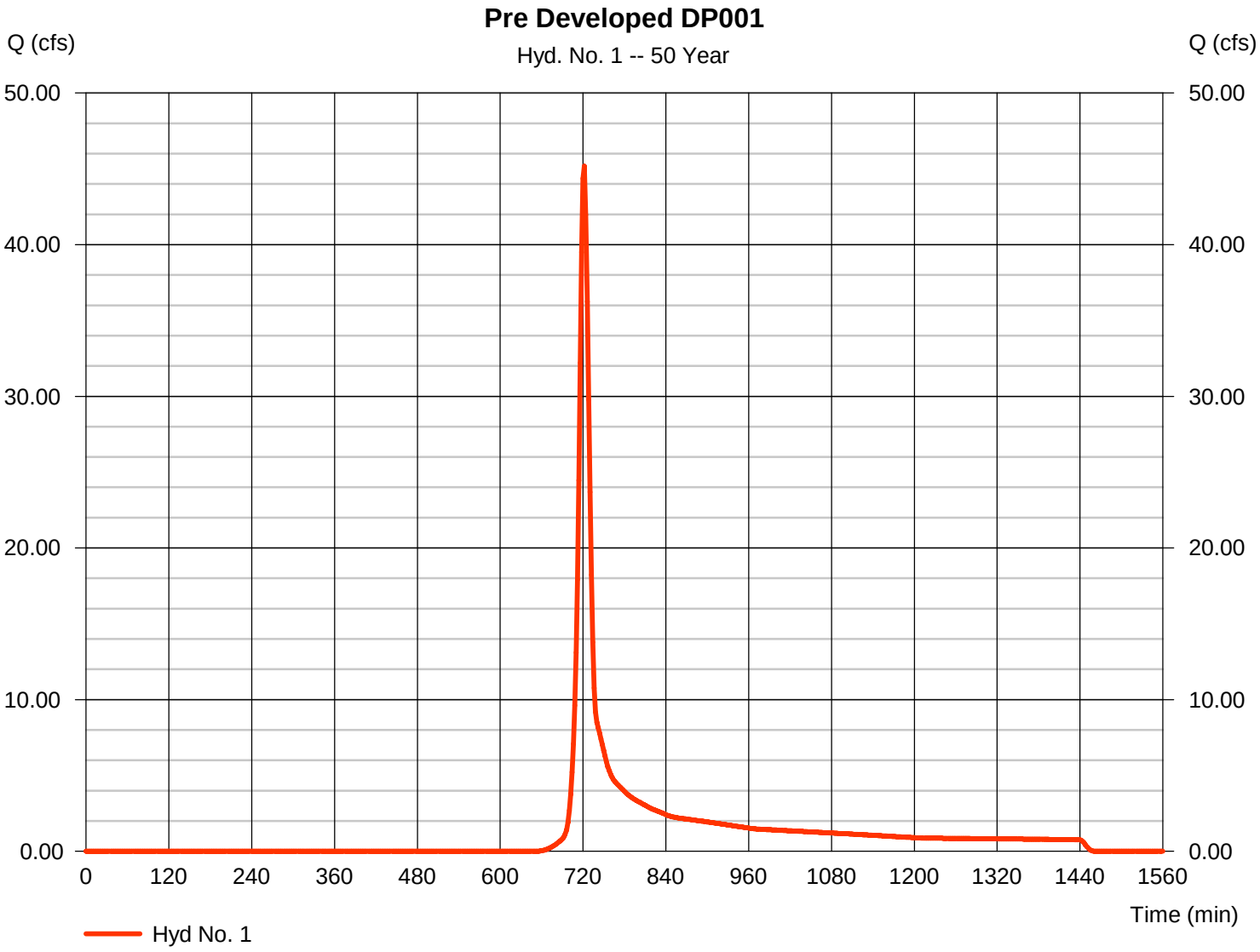
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 13 / 2023

Hyd. No. 1

Pre Developed DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	45.18 cfs
Storm frequency	=	50 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	121,090 cuft
Drainage area	=	15.430 ac	Curve number	=	57.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



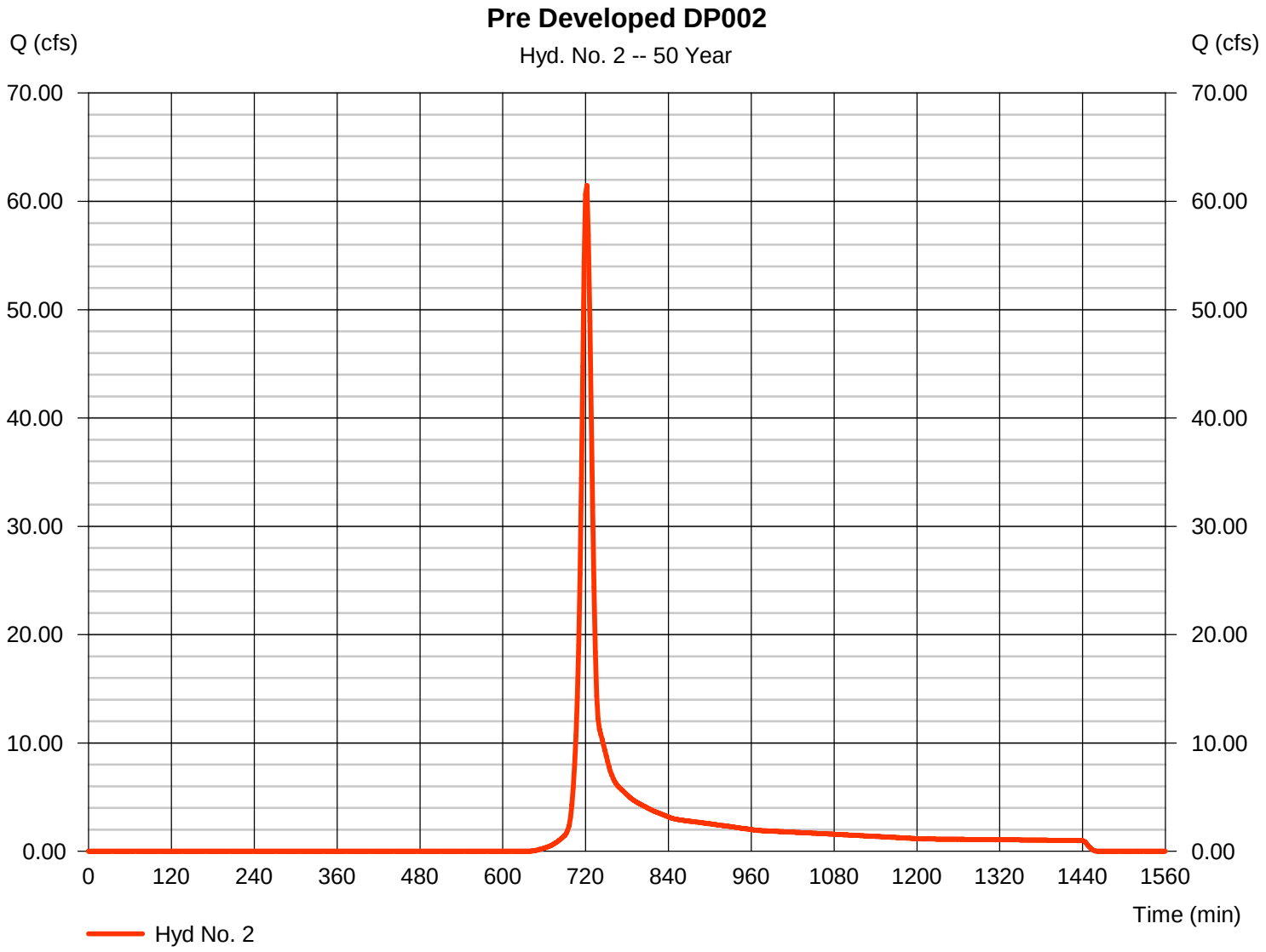
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 13 / 2023

Hyd. No. 2

Pre Developed DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	61.46 cfs
Storm frequency	=	50 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	163,179 cuft
Drainage area	=	19.210 ac	Curve number	=	59.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

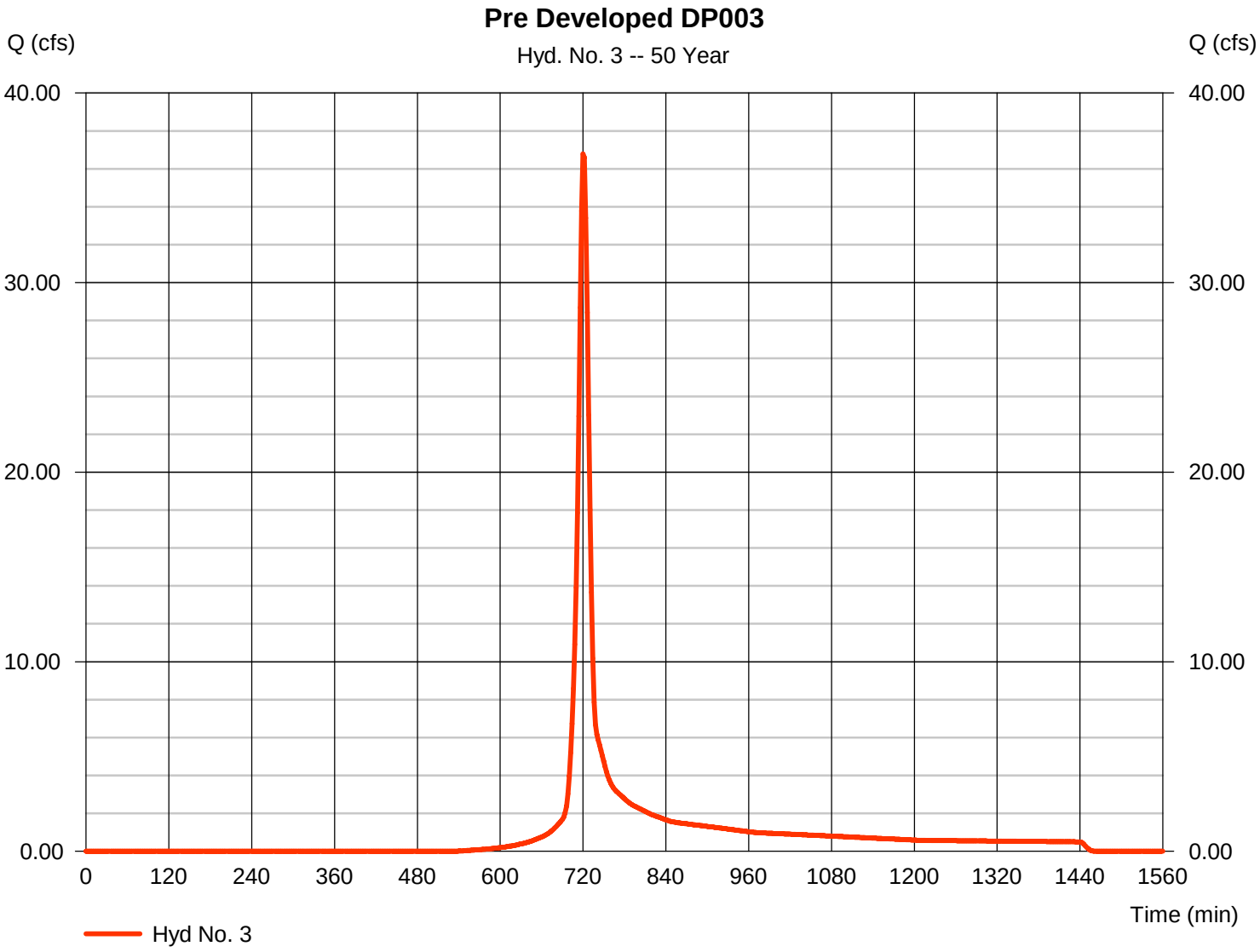


Hydrograph Report

Hyd. No. 3

Pre Developed DP003

Hydrograph type	=	SCS Runoff	Peak discharge	=	36.78 cfs
Storm frequency	=	50 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	95,632 cuft
Drainage area	=	8.190 ac	Curve number	=	68.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



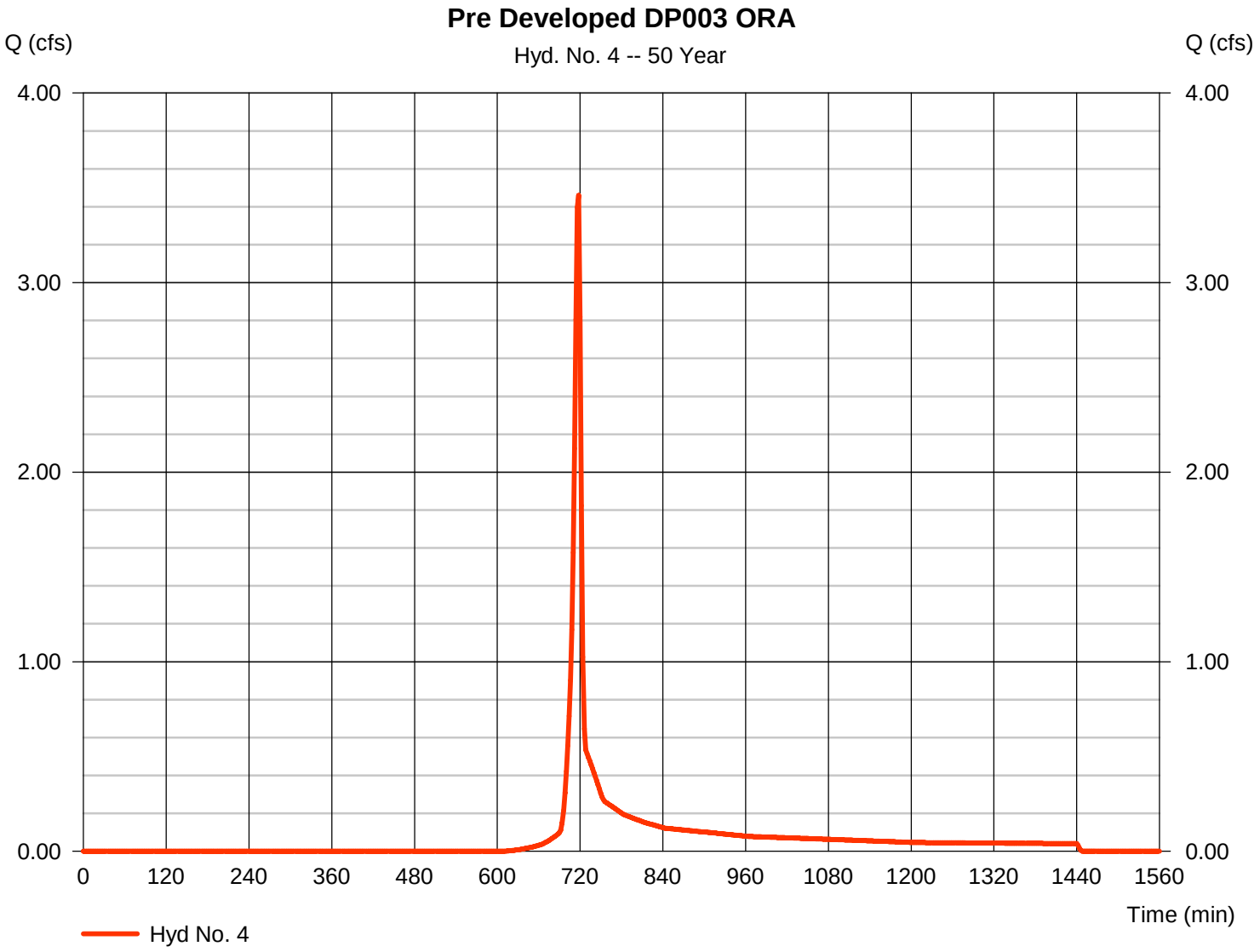
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 13 / 2023

Hyd. No. 4

Pre Developed DP003 ORA

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.460 cfs
Storm frequency	=	50 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	6,921 cuft
Drainage area	=	0.810 ac	Curve number	=	62
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

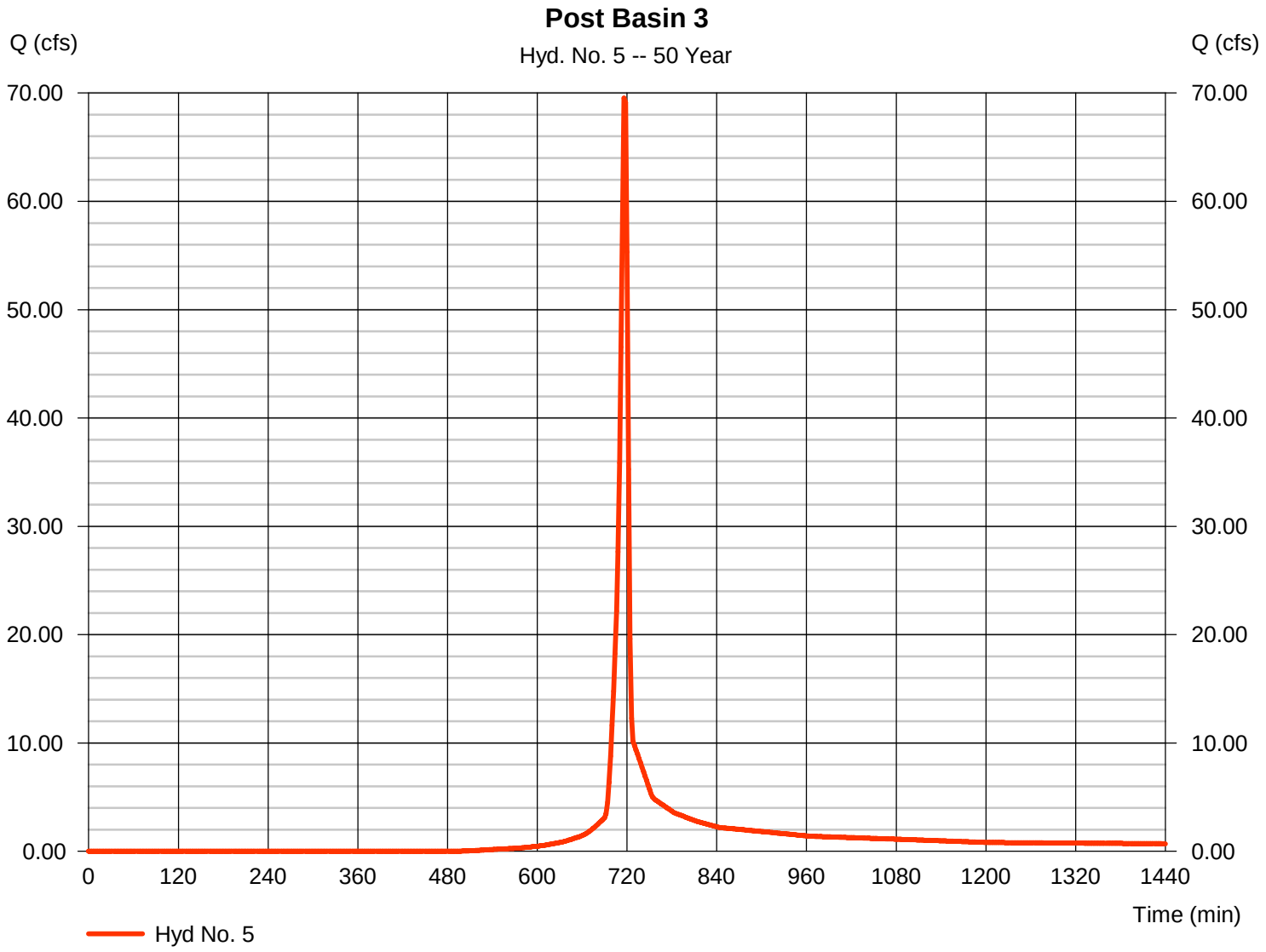


Hydrograph Report

Hyd. No. 5

Post Basin 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	69.54 cfs
Storm frequency	=	50 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	140,558 cuft
Drainage area	=	12.150 ac	Curve number	=	71.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



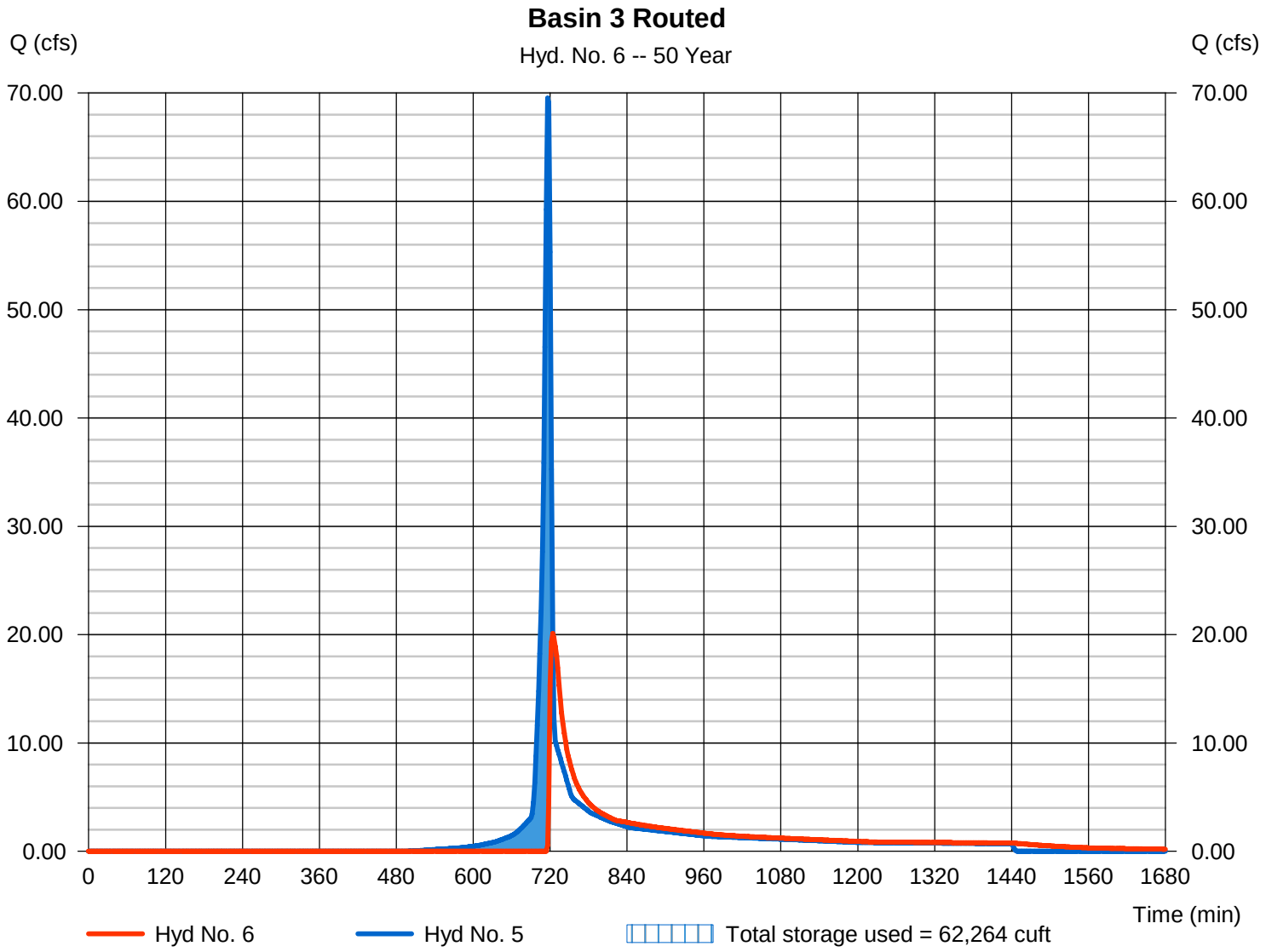
Hydrograph Report

Hyd. No. 6

Basin 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	20.11 cfs
Storm frequency	=	50 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	103,374 cuft
Inflow hyd. No.	=	5 - Post Basin 3	Max. Elevation	=	319.14 ft
Reservoir name	=	Basin 3	Max. Storage	=	62,264 cuft

Storage Indication method used.

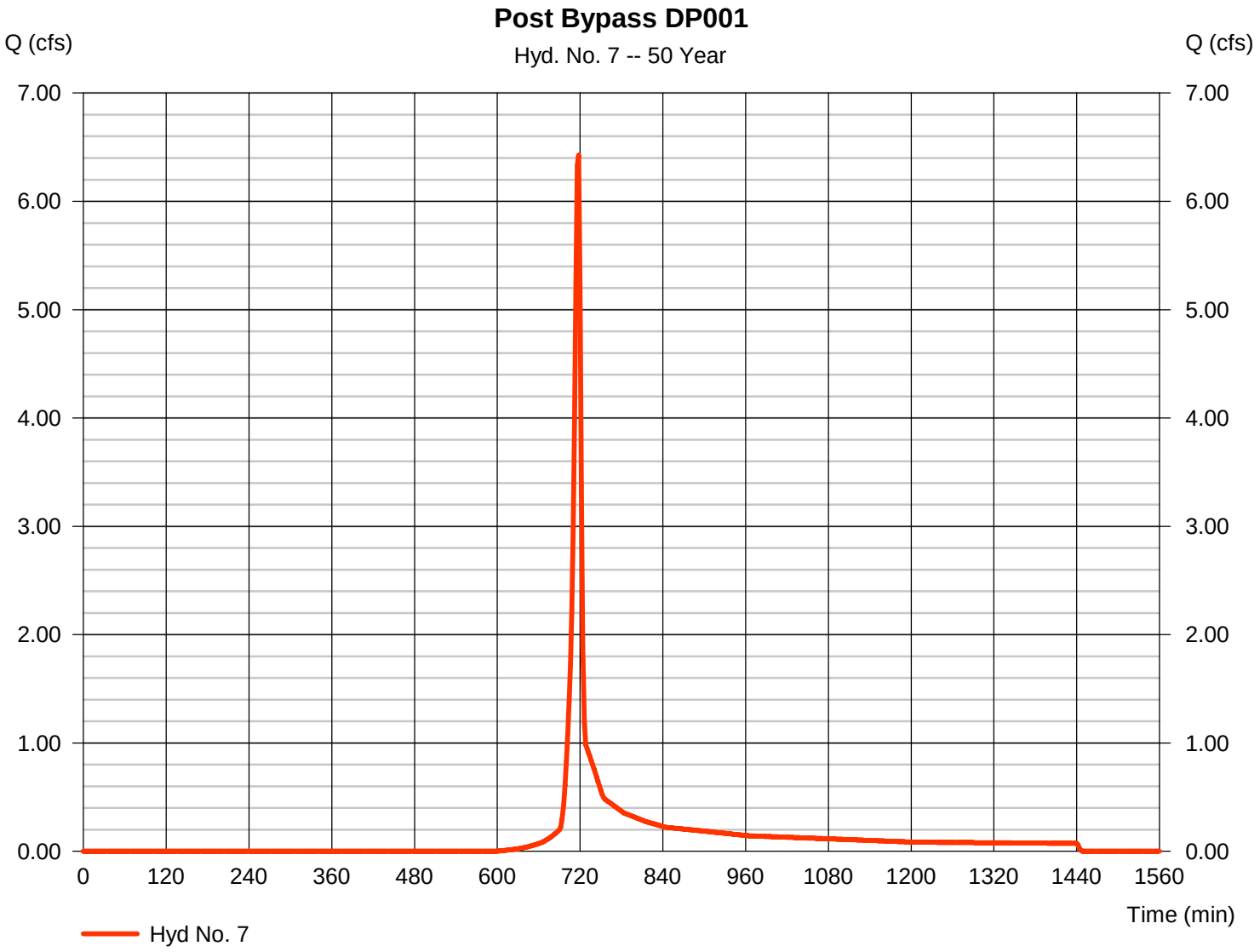


Hydrograph Report

Hyd. No. 7

Post Bypass DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.425 cfs
Storm frequency	=	50 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	12,860 cuft
Drainage area	=	1.440 ac	Curve number	=	63.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

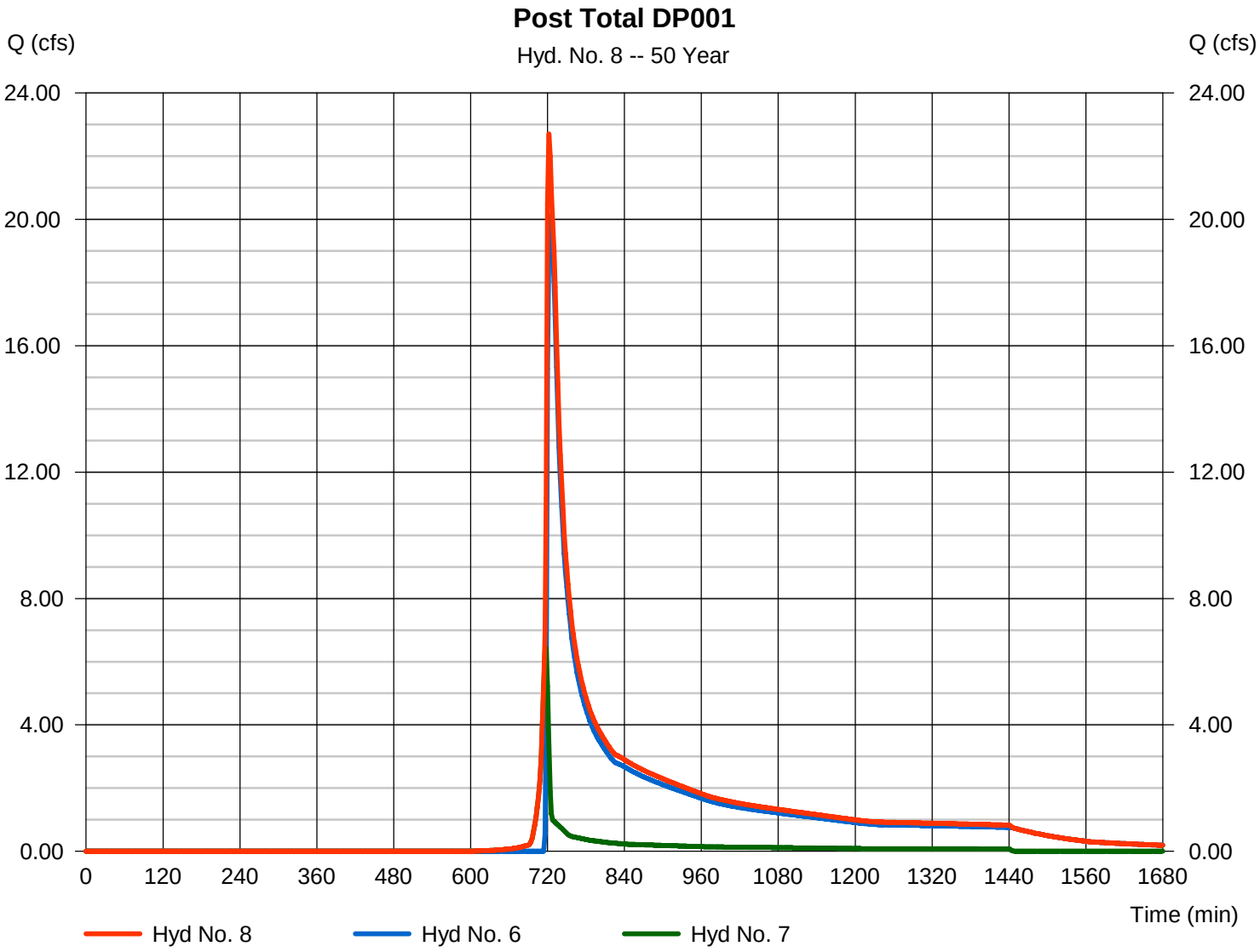


Hydrograph Report

Hyd. No. 8

Post Total DP001

Hydrograph type	= Combine	Peak discharge	= 22.70 cfs
Storm frequency	= 50 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 116,234 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 1.440 ac

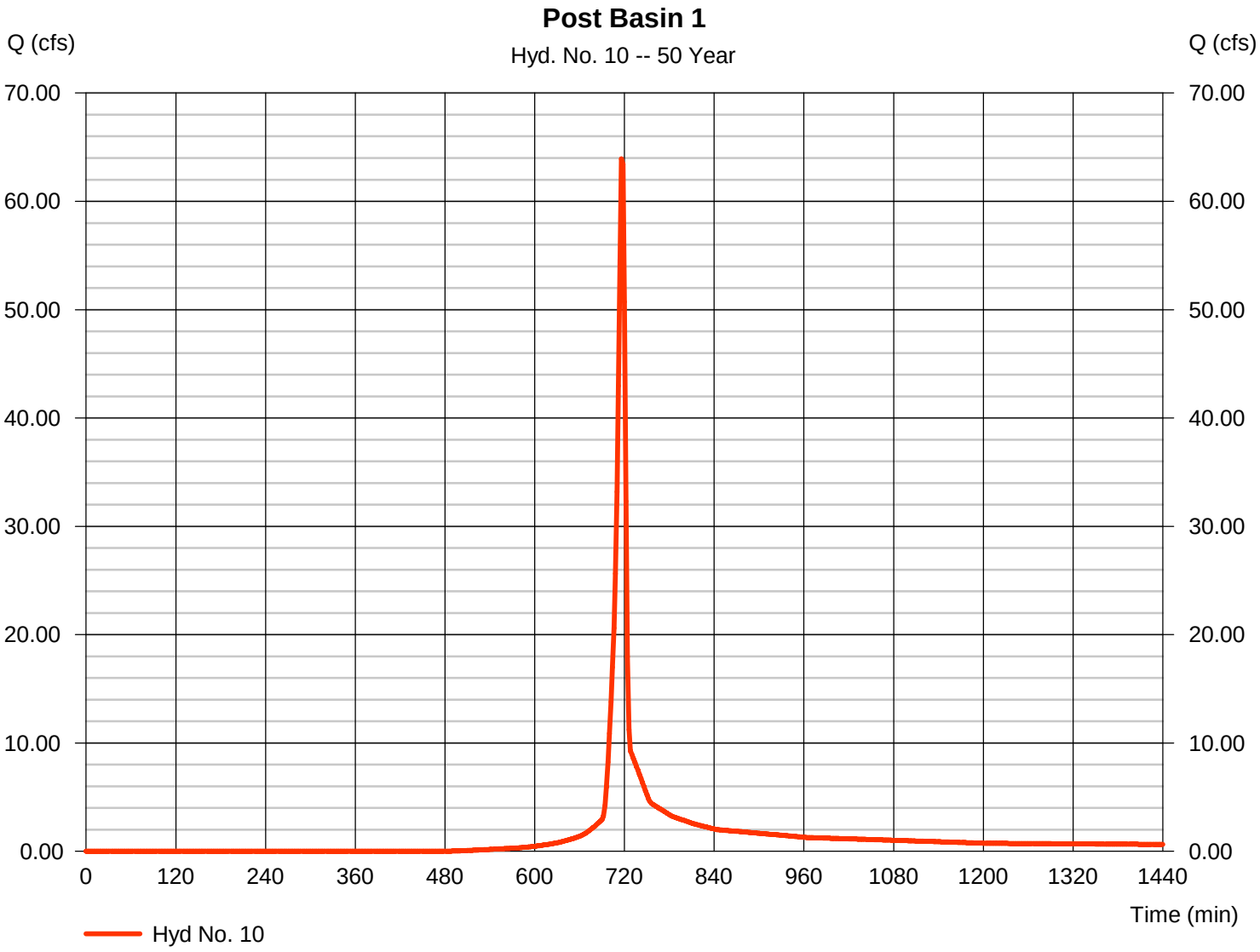


Hydrograph Report

Hyd. No. 10

Post Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	63.94 cfs
Storm frequency	=	50 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	129,319 cuft
Drainage area	=	10.950 ac	Curve number	=	71.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



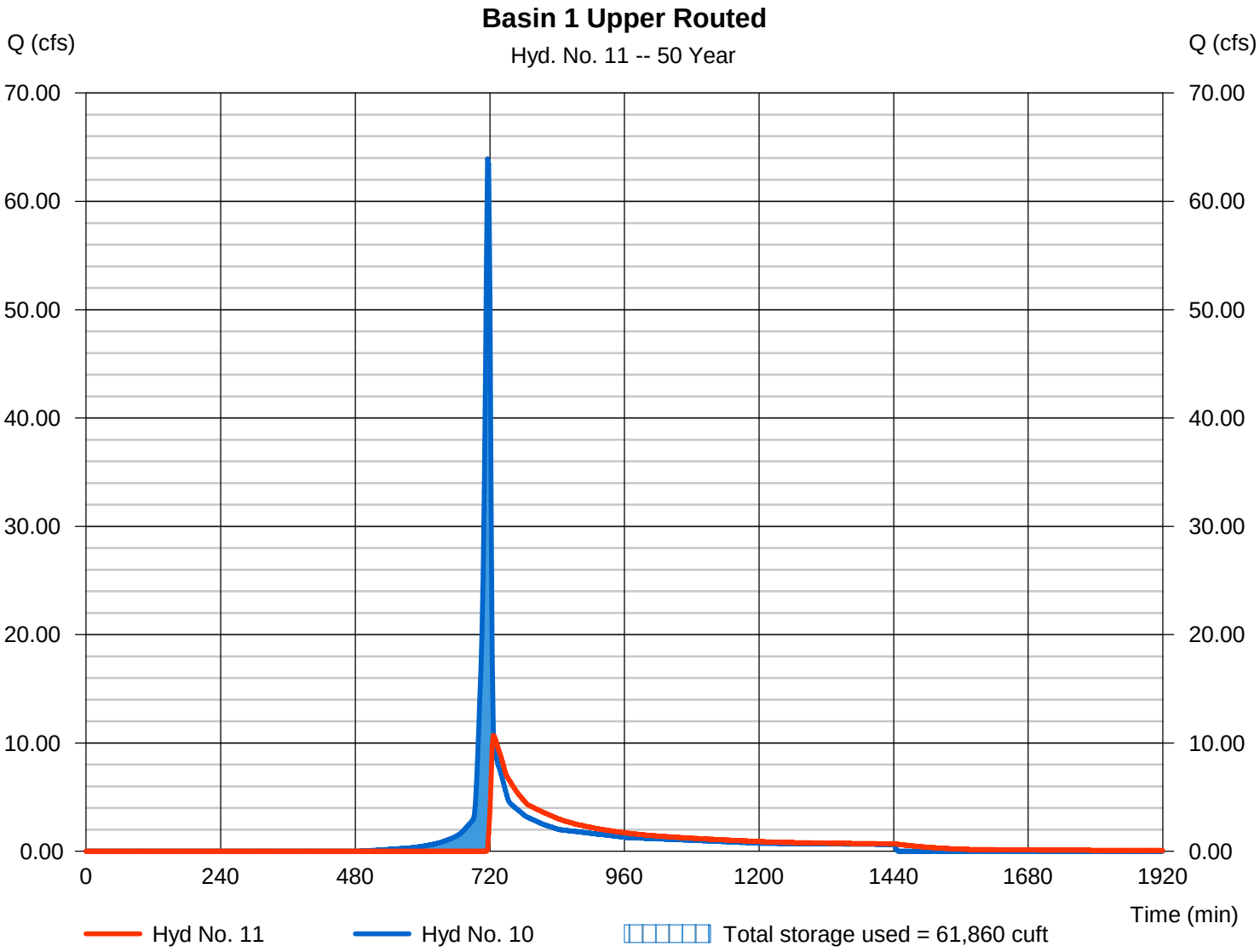
Hydrograph Report

Hyd. No. 11

Basin 1 Upper Routed

Hydrograph type	=	Reservoir	Peak discharge	=	10.69 cfs
Storm frequency	=	50 yrs	Time to peak	=	726 min
Time interval	=	2 min	Hyd. volume	=	91,830 cuft
Inflow hyd. No.	=	10 - Post Basin 1	Max. Elevation	=	323.71 ft
Reservoir name	=	Basin 1 Upper	Max. Storage	=	61,860 cuft

Storage Indication method used.



Hydrograph Report

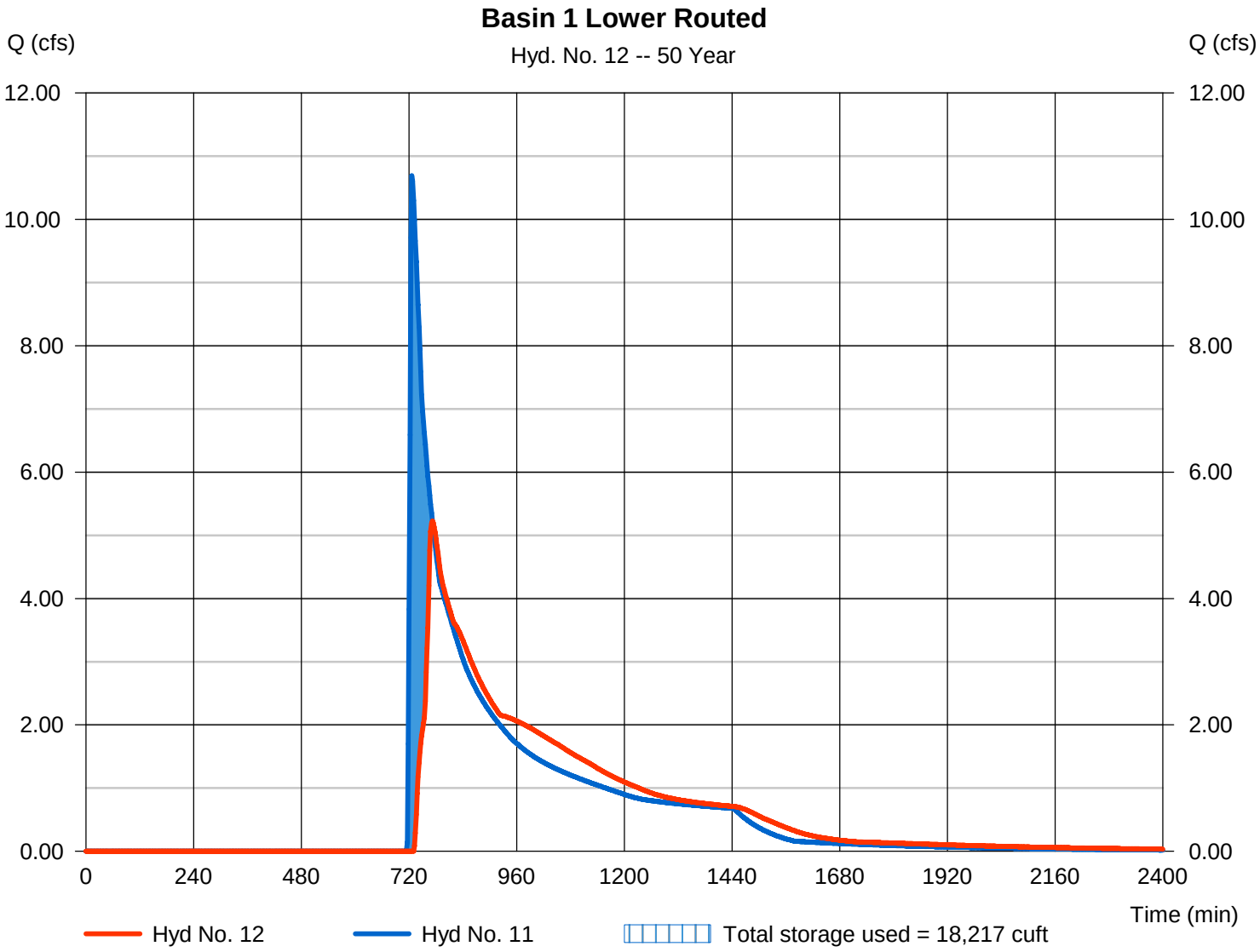
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Tuesday, 06 / 13 / 2023

Hyd. No. 12

Basin 1 Lower Routed

Hydrograph type	=	Reservoir	Peak discharge	=	5.226 cfs
Storm frequency	=	50 yrs	Time to peak	=	772 min
Time interval	=	2 min	Hyd. volume	=	85,633 cuft
Inflow hyd. No.	=	11 - Basin 1 Upper Routed	Max. Elevation	=	305.66 ft
Reservoir name	=	Basin 1 Lower	Max. Storage	=	18,217 cuft

Storage Indication method used.

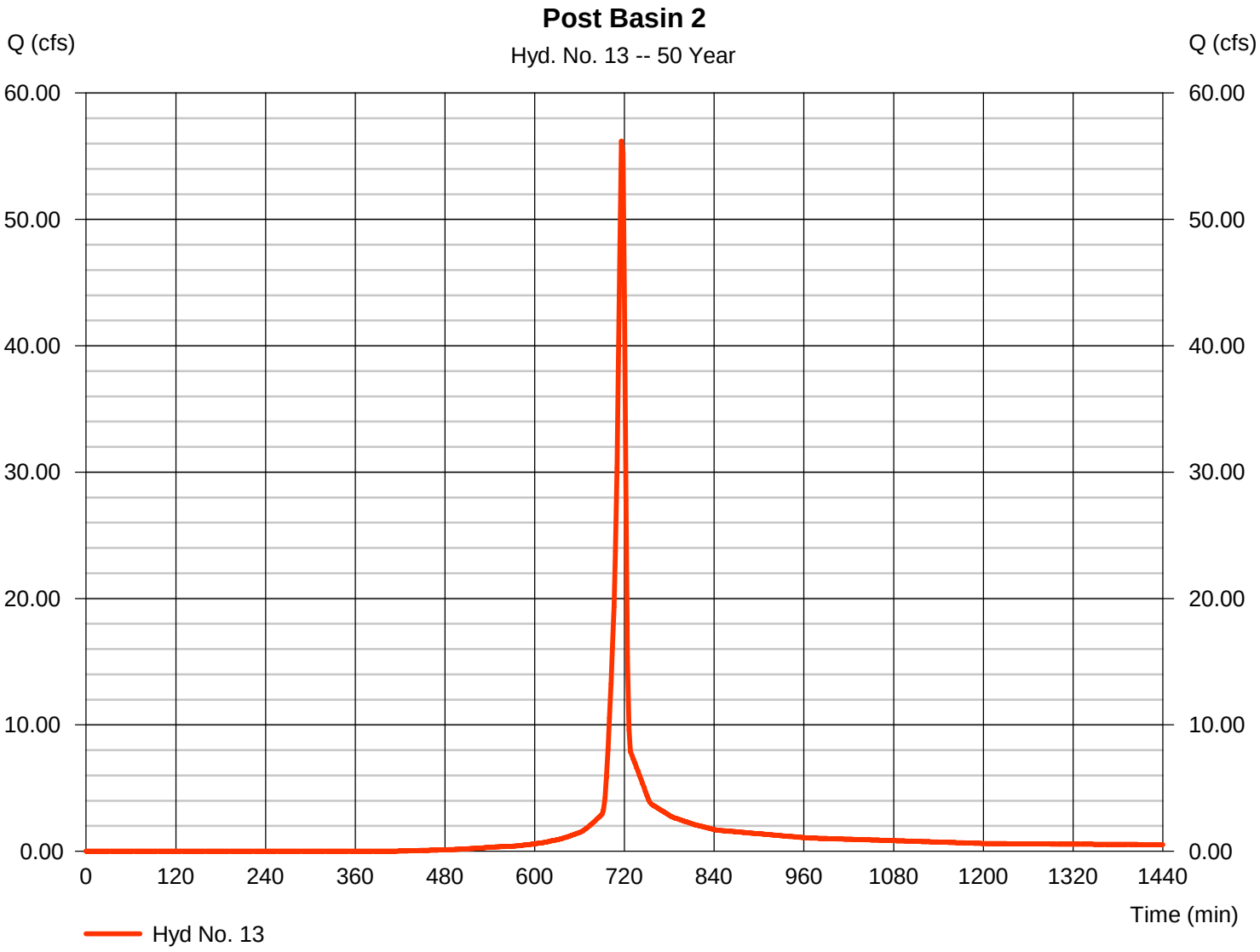


Hydrograph Report

Hyd. No. 13

Post Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	56.20 cfs
Storm frequency	=	50 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	114,655 cuft
Drainage area	=	8.540 ac	Curve number	=	76.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



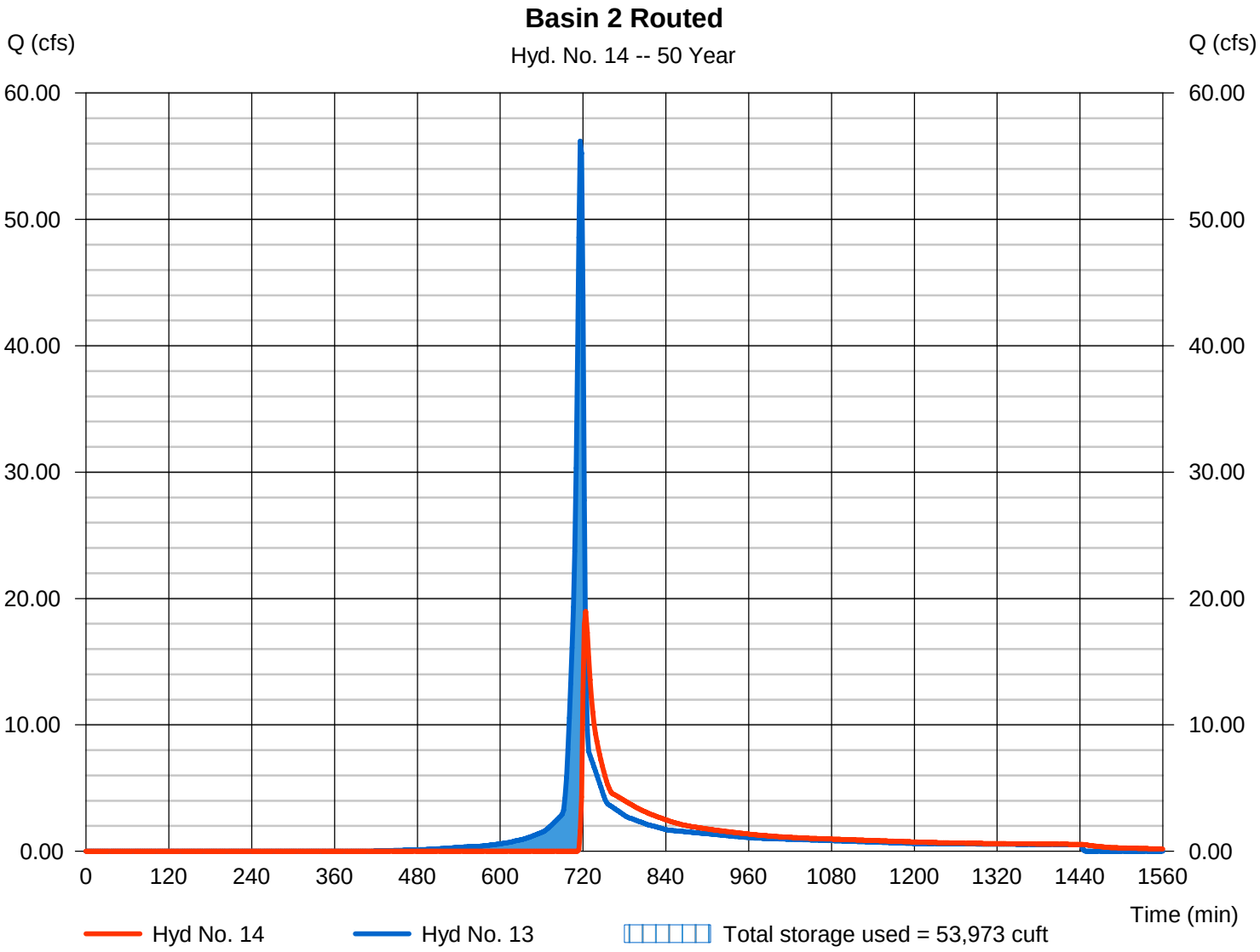
Hydrograph Report

Hyd. No. 14

Basin 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	18.98 cfs
Storm frequency	=	50 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	82,300 cuft
Inflow hyd. No.	=	13 - Post Basin 2	Max. Elevation	=	310.22 ft
Reservoir name	=	Basin 2	Max. Storage	=	53,973 cuft

Storage Indication method used.

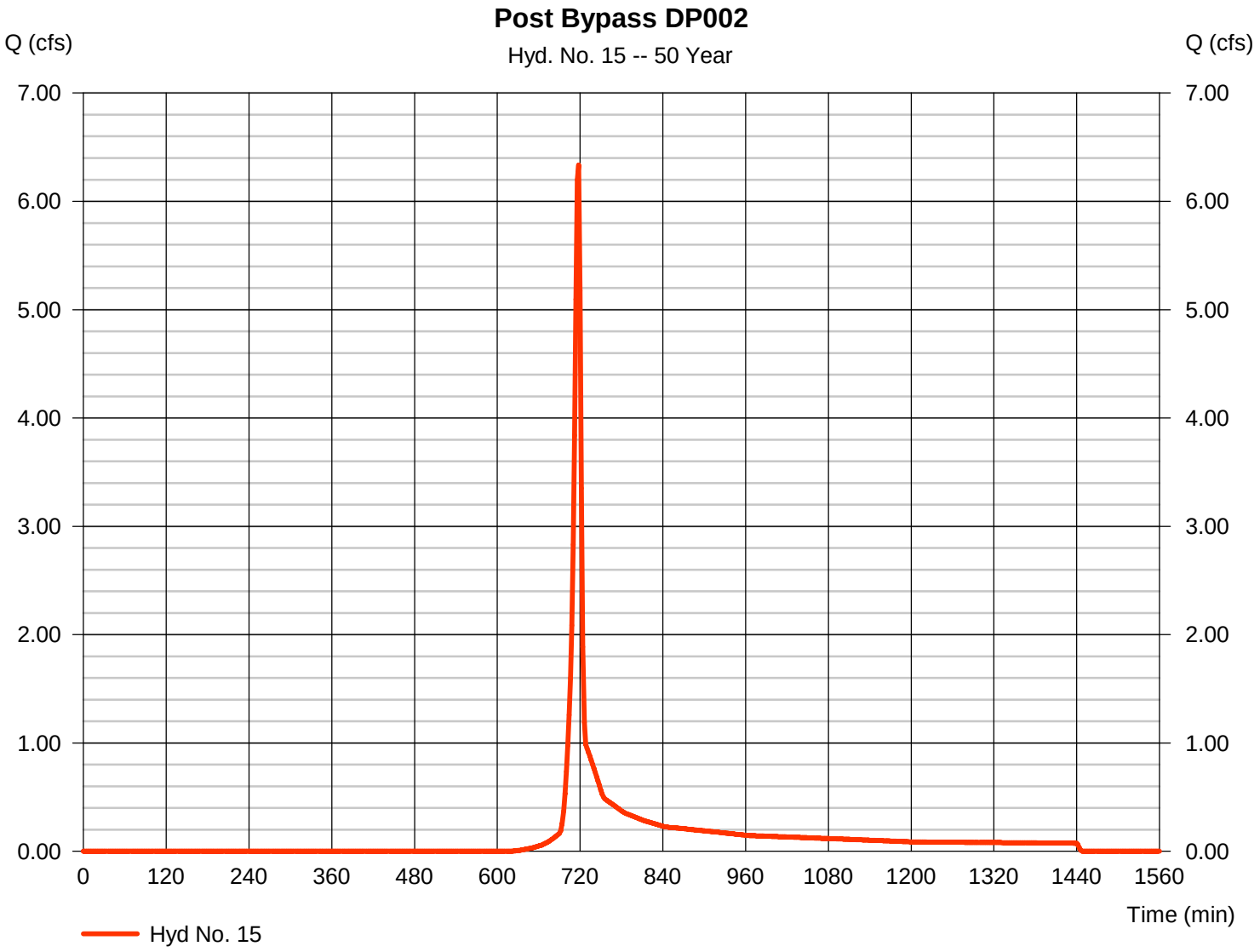


Hydrograph Report

Hyd. No. 15

Post Bypass DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.335 cfs
Storm frequency	=	50 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	12,668 cuft
Drainage area	=	1.540 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

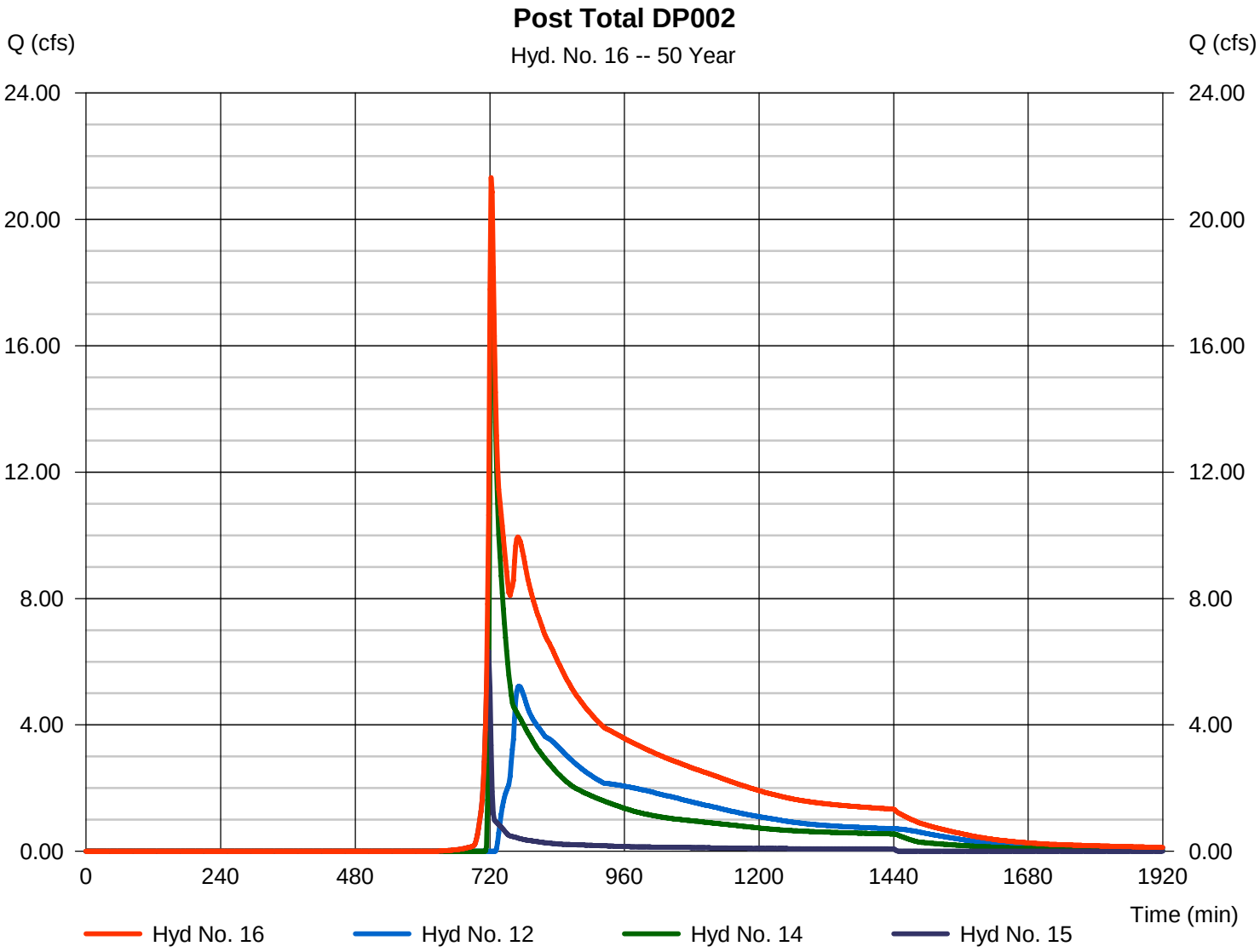


Hydrograph Report

Hyd. No. 16

Post Total DP002

Hydrograph type	=	Combine	Peak discharge	=	21.32 cfs
Storm frequency	=	50 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	180,602 cuft
Inflow hyds.	=	12, 14, 15	Contrib. drain. area	=	1.540 ac



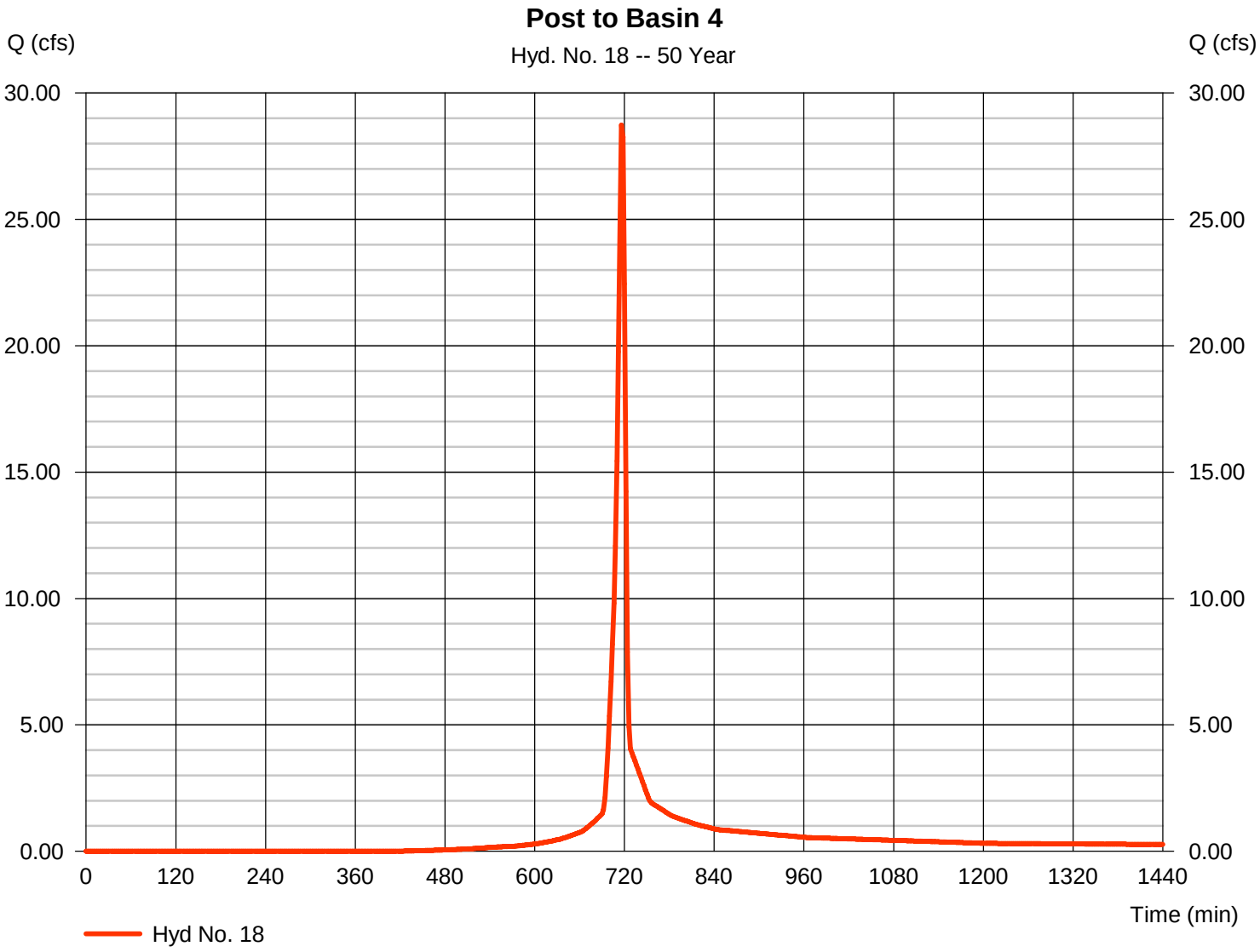
Hydrograph Report

Hyd. No. 18

Post to Basin 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.74 cfs
Storm frequency	=	50 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	58,554 cuft
Drainage area	=	4.420 ac	Curve number	=	75.9*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.910 x 61) + (2.270 x 98) + (3.040 x 78)] / 4.420



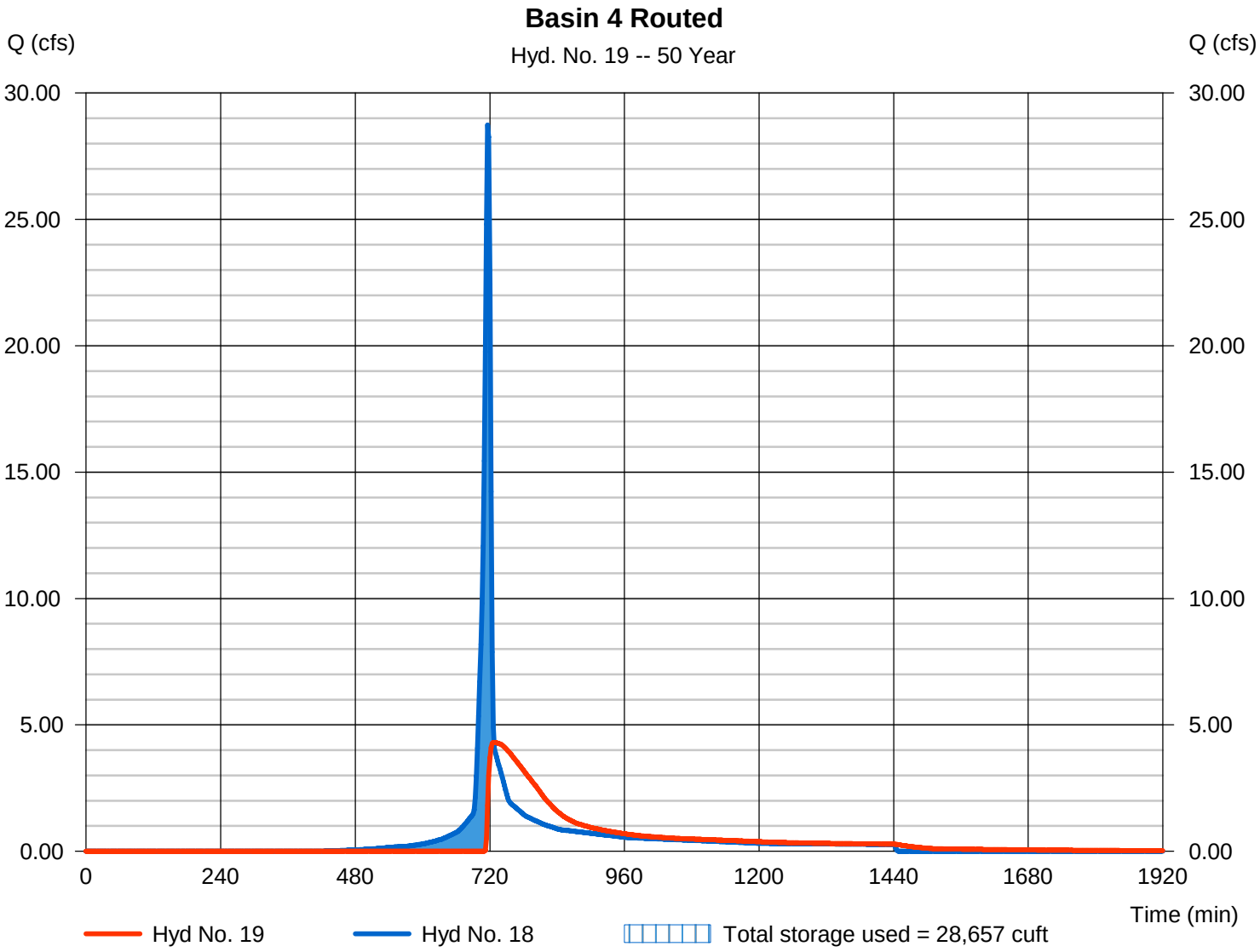
Hydrograph Report

Hyd. No. 19

Basin 4 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	4.304 cfs
Storm frequency	=	50 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	44,749 cuft
Inflow hyd. No.	=	18 - Post to Basin 4	Max. Elevation	=	348.05 ft
Reservoir name	=	Basin 4	Max. Storage	=	28,657 cuft

Storage Indication method used.



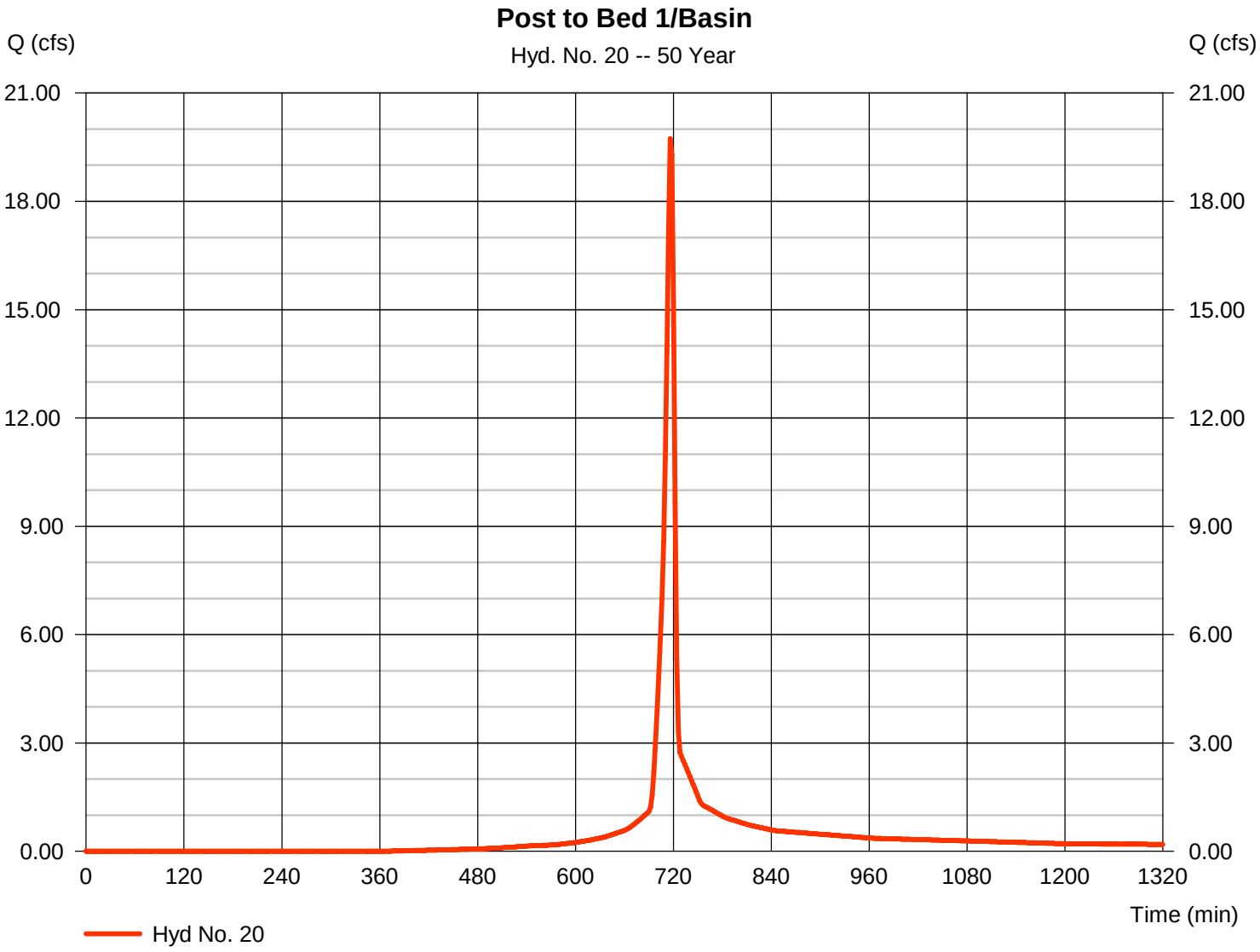
Hydrograph Report

Hyd. No. 20

Post to Bed 1/Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	19.73 cfs
Storm frequency	=	50 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	40,599 cuft
Drainage area	=	2.820 ac	Curve number	=	79.1*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.910 x 61) + (2.270 x 98) + (3.040 x 78)] / 2.820



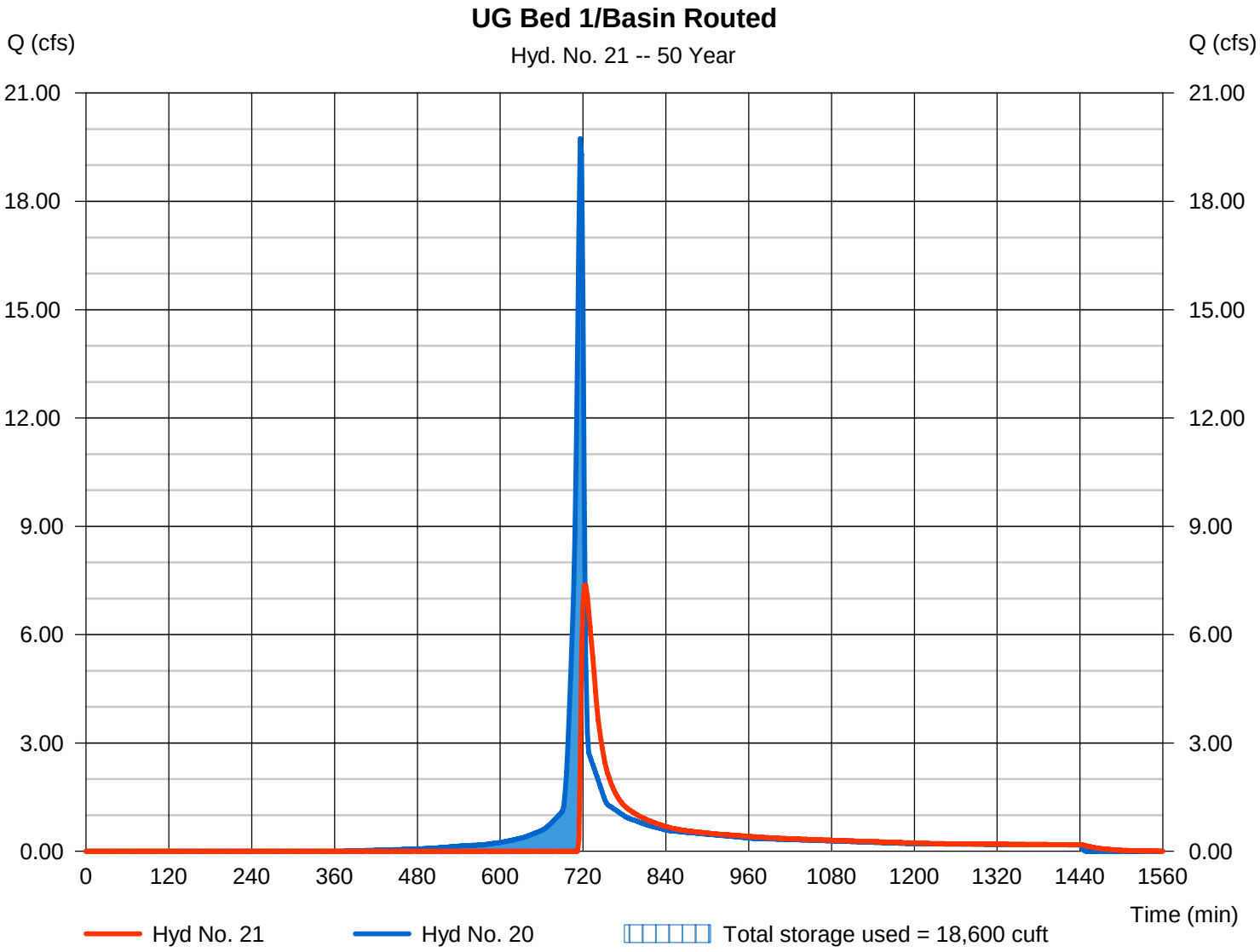
Hydrograph Report

Hyd. No. 21

UG Bed 1/Basin Routed

Hydrograph type	=	Reservoir	Peak discharge	=	7.370 cfs
Storm frequency	=	50 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	28,502 cuft
Inflow hyd. No.	=	20 - Post to Bed 1/Basin	Max. Elevation	=	341.74 ft
Reservoir name	=	UG Bed 1/Basin	Max. Storage	=	18,600 cuft

Storage Indication method used.

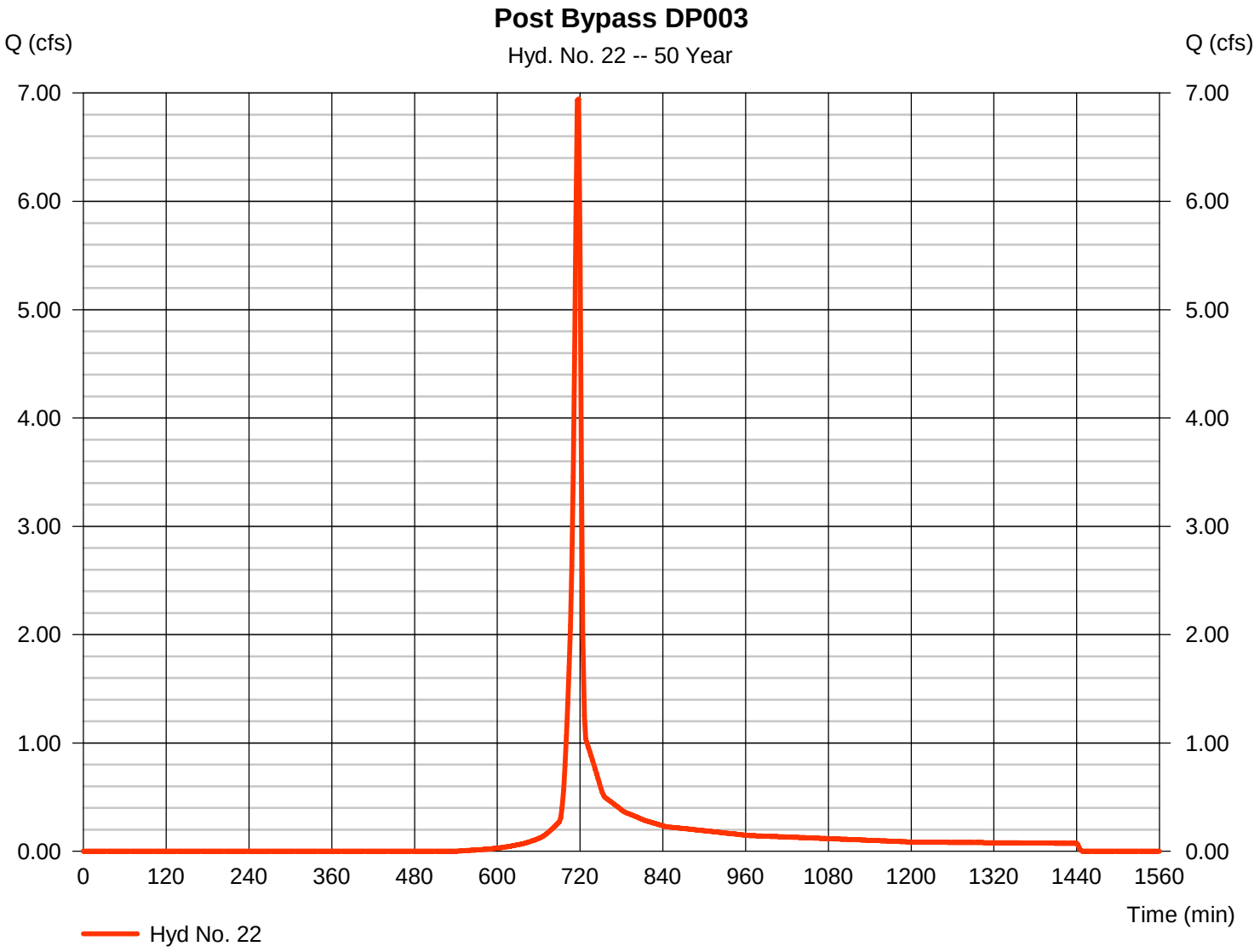


Hydrograph Report

Hyd. No. 22

Post Bypass DP003

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.944 cfs
Storm frequency	=	50 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	13,999 cuft
Drainage area	=	1.340 ac	Curve number	=	67.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	6.60 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

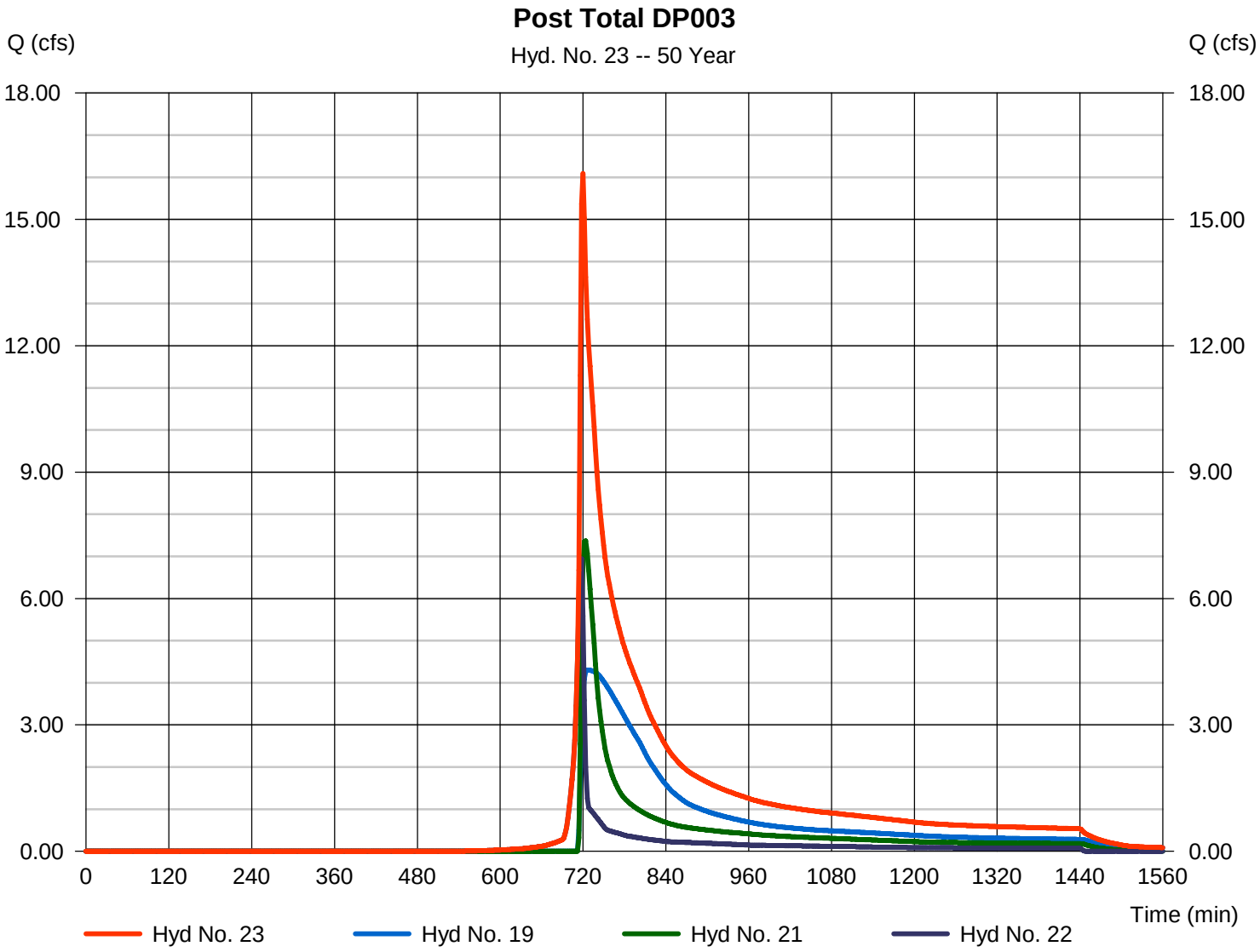


Hydrograph Report

Hyd. No. 23

Post Total DP003

Hydrograph type	= Combine	Peak discharge	= 16.09 cfs
Storm frequency	= 50 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 87,250 cuft
Inflow hyds.	= 19, 21, 22	Contrib. drain. area	= 1.340 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

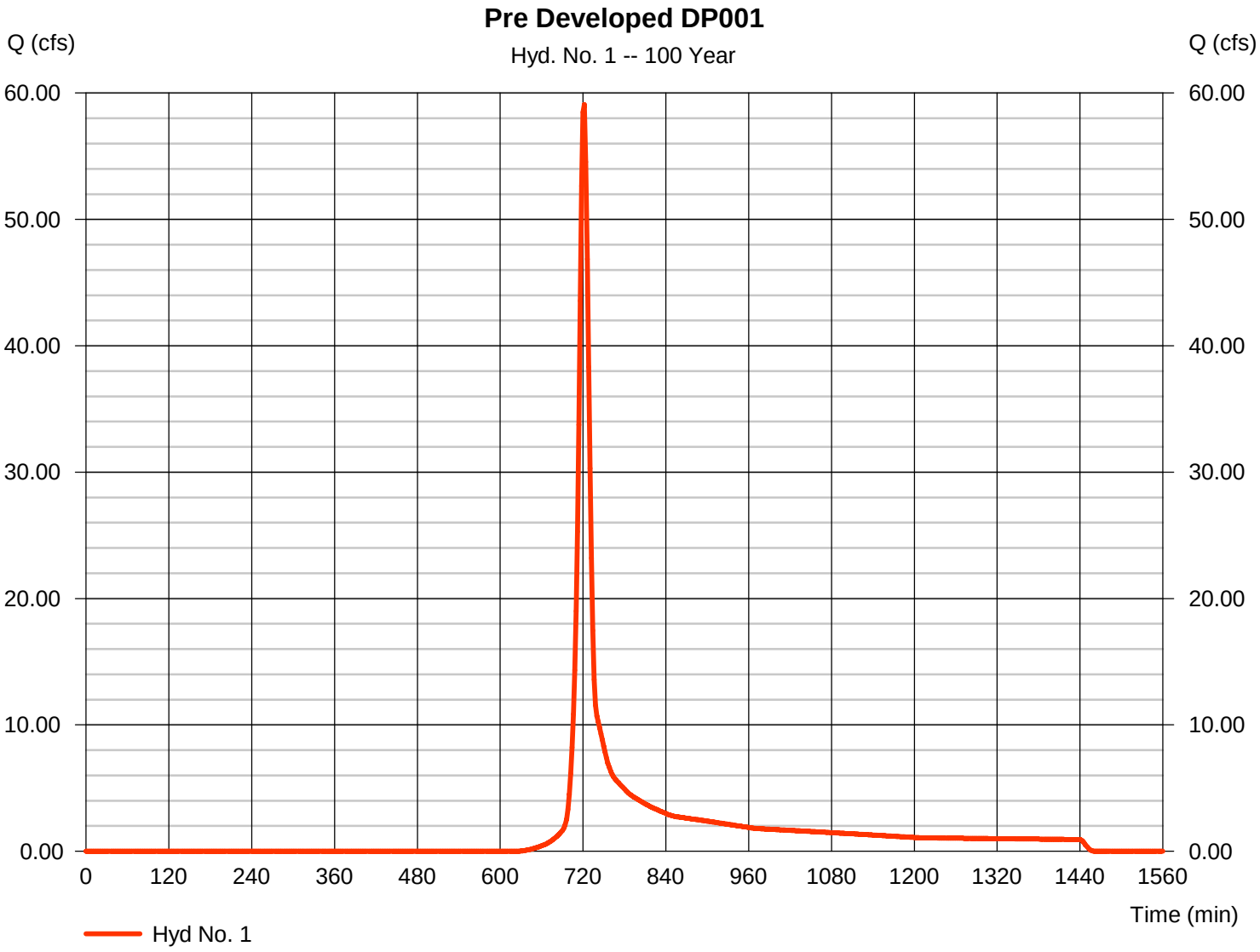
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	59.08	2	722	156,154	------	------	------	Pre Developed DP001
2	SCS Runoff	79.34	2	722	208,579	------	------	------	Pre Developed DP002
3	SCS Runoff	45.54	2	720	118,084	------	------	------	Pre Developed DP003
4	SCS Runoff	4.363	2	718	8,749	------	------	------	Pre Developed DP003 ORA
5	SCS Runoff	84.80	2	716	171,967	------	------	------	Post Basin 3
6	Reservoir	24.42	2	724	134,783	5	319.74	75,335	Basin 3 Routed
7	SCS Runoff	8.052	2	718	16,178	------	------	------	Post Bypass DP001
8	Combine	29.25	2	718	150,961	6, 7	------	------	Post Total DP001
10	SCS Runoff	77.75	2	716	157,867	------	------	------	Post Basin 1
11	Reservoir	30.18	2	722	120,378	10	324.12	70,140	Basin 1 Upper Routed
12	Reservoir	13.13	2	738	114,181	11	305.96	20,385	Basin 1 Lower Routed
13	SCS Runoff	67.22	2	716	138,052	------	------	------	Post Basin 2
14	Reservoir	33.12	2	722	105,698	13	310.57	60,504	Basin 2 Routed
15	SCS Runoff	8.028	2	718	16,080	------	------	------	Post Bypass DP002
16	Combine	37.69	2	720	235,959	12, 14, 15	------	------	Post Total DP002
18	SCS Runoff	34.43	2	716	70,605	------	------	------	Post to Basin 4
19	Reservoir	10.36	2	724	56,799	18	348.51	33,578	Basin 4 Routed
20	SCS Runoff	23.40	2	716	48,517	------	------	------	Post to Bed 1/Basin
21	Reservoir	10.57	2	722	36,419	20	342.30	21,484	UG Bed 1/Basin Routed
22	SCS Runoff	8.571	2	716	17,315	------	------	------	Post Bypass DP003
23	Combine	24.22	2	722	110,534	19, 21, 22	------	------	Post Total DP003

Hydrograph Report

Hyd. No. 1

Pre Developed DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	59.08 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	156,154 cuft
Drainage area	=	15.430 ac	Curve number	=	57.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

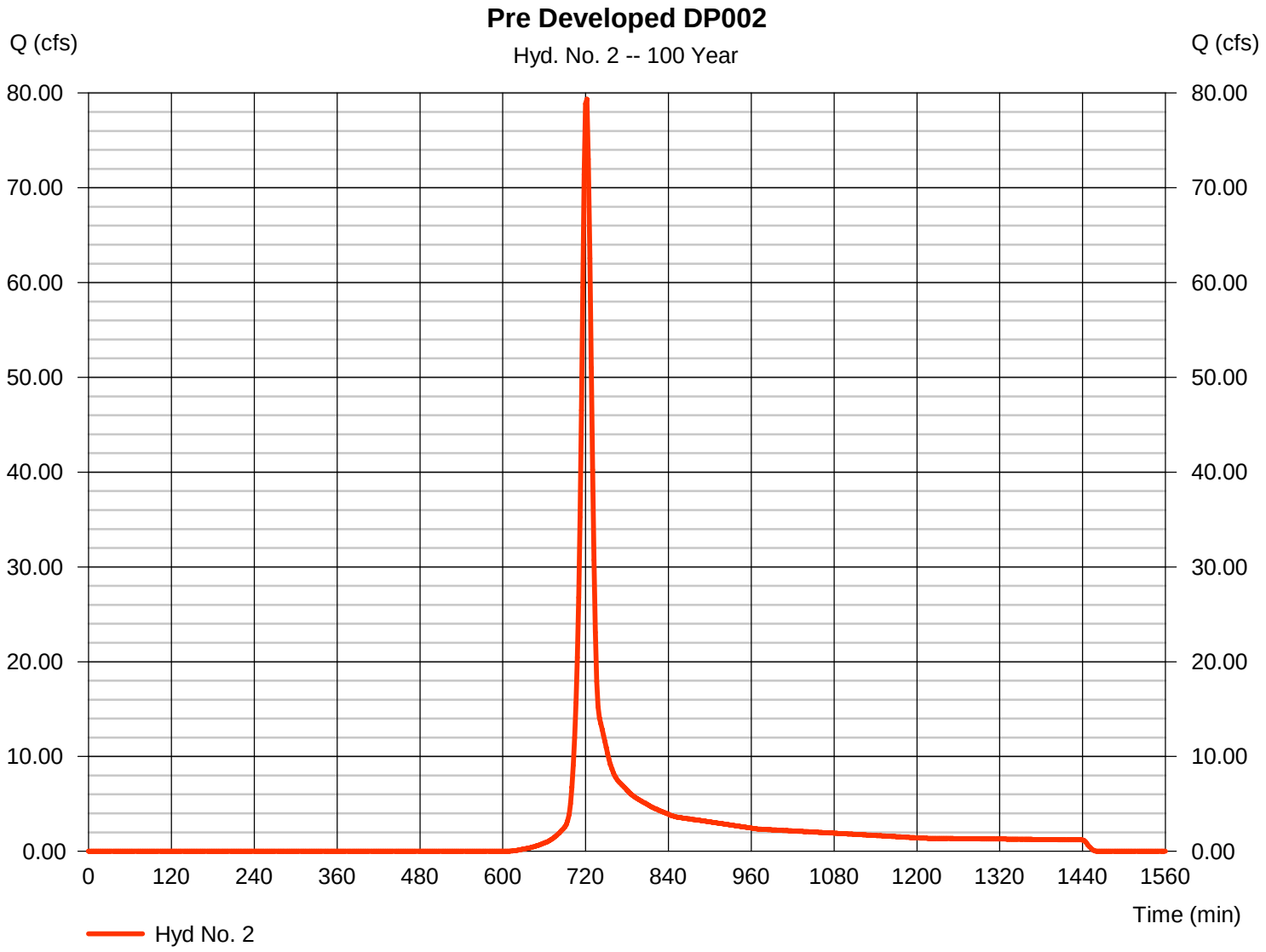


Hydrograph Report

Hyd. No. 2

Pre Developed DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	79.34 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	208,579 cuft
Drainage area	=	19.210 ac	Curve number	=	59.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

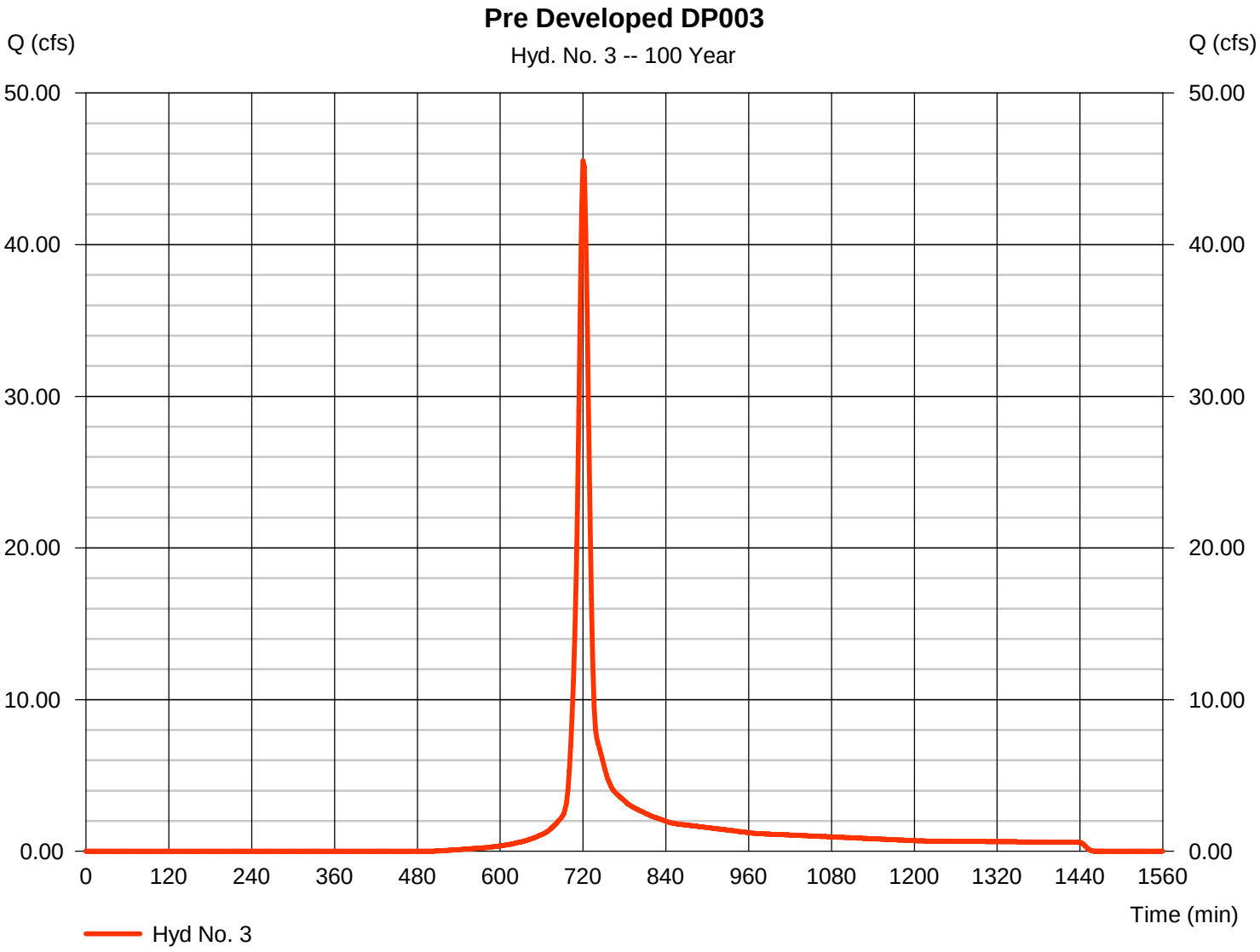


Hydrograph Report

Hyd. No. 3

Pre Developed DP003

Hydrograph type	=	SCS Runoff	Peak discharge	=	45.54 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	118,084 cuft
Drainage area	=	8.190 ac	Curve number	=	68.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	11.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

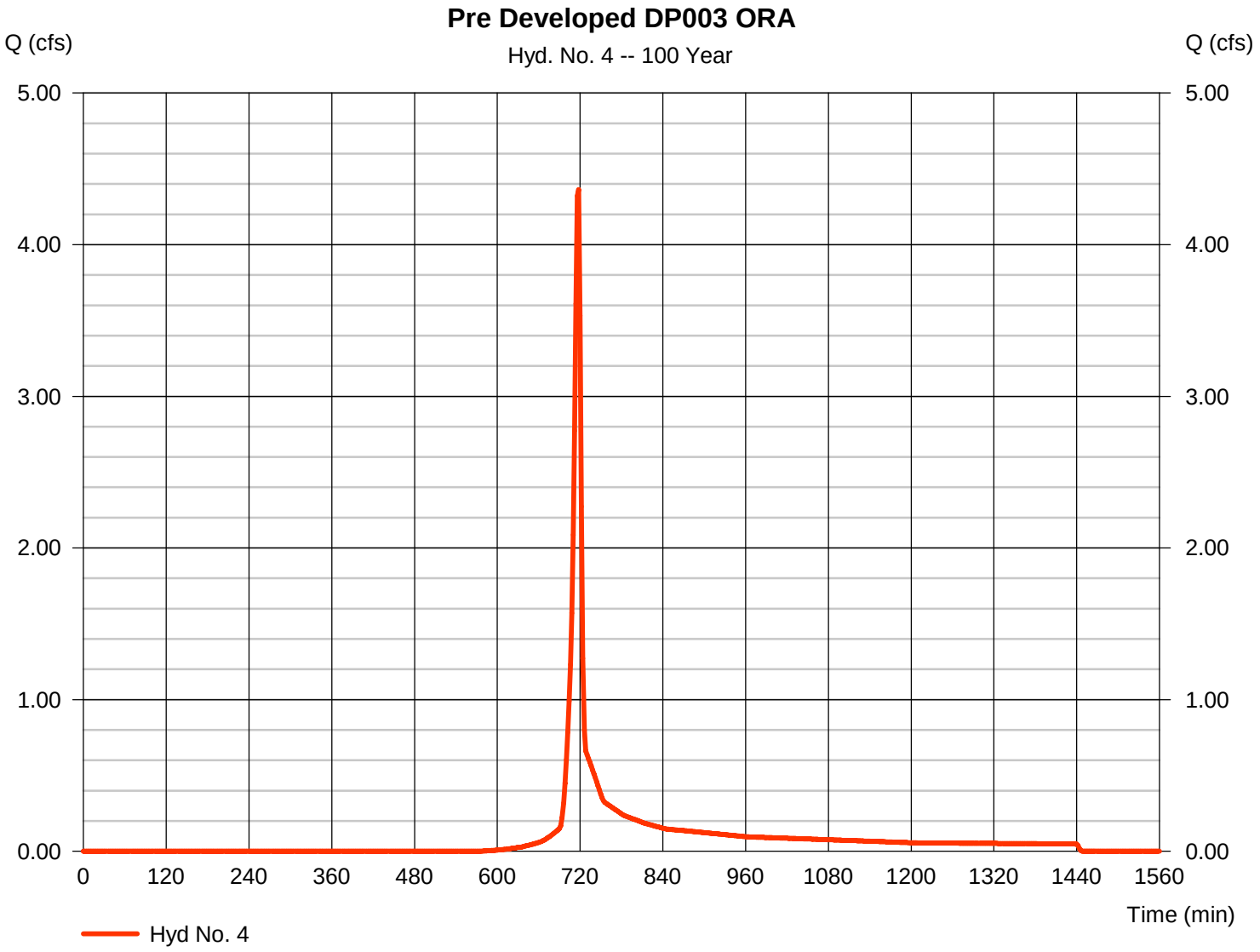


Hydrograph Report

Hyd. No. 4

Pre Developed DP003 ORA

Hydrograph type	= SCS Runoff	Peak discharge	= 4.363 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 8,749 cuft
Drainage area	= 0.810 ac	Curve number	= 62
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

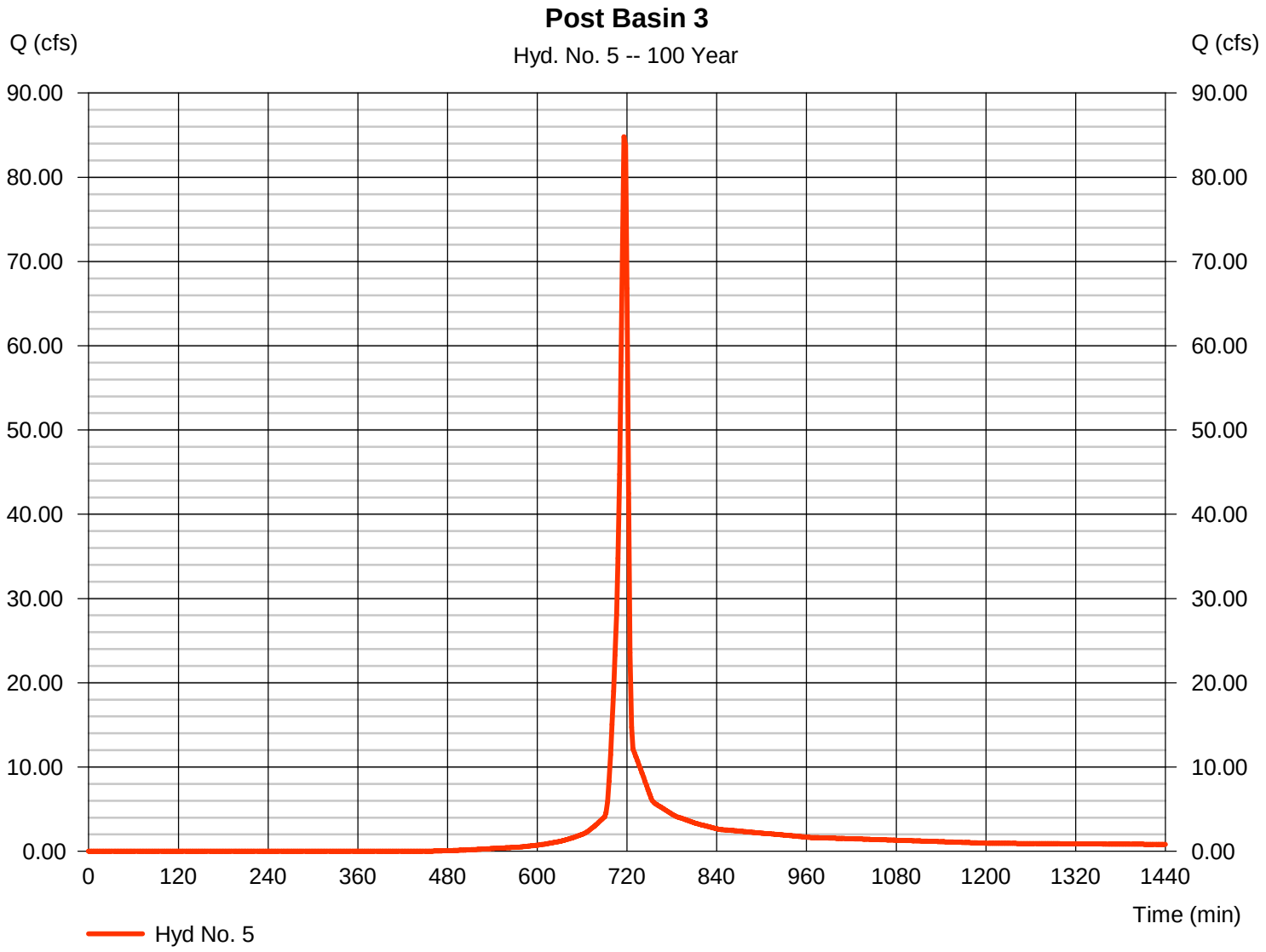


Hydrograph Report

Hyd. No. 5

Post Basin 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	84.80 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	171,967 cuft
Drainage area	=	12.150 ac	Curve number	=	71.1
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



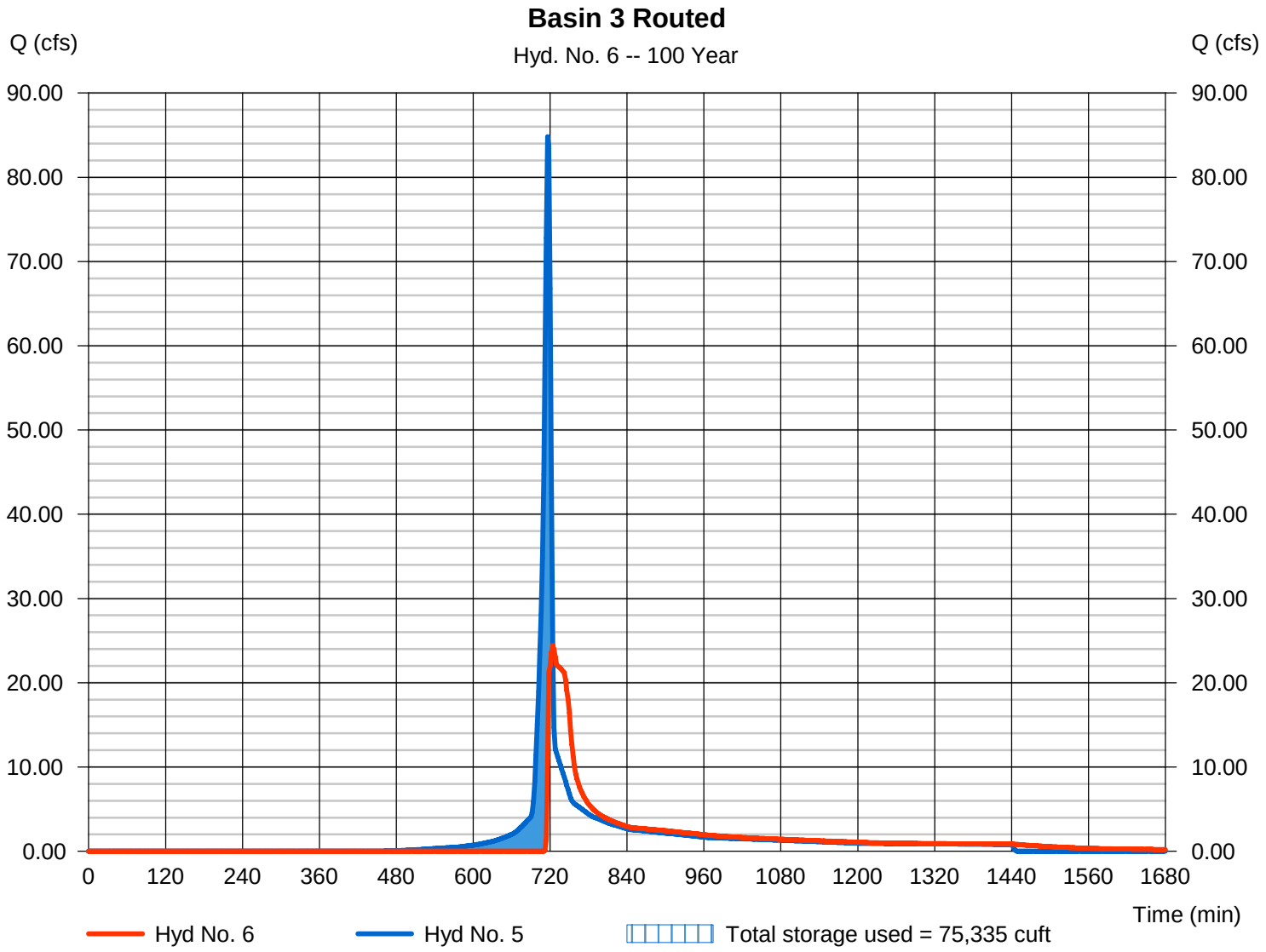
Hydrograph Report

Hyd. No. 6

Basin 3 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	24.42 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	134,783 cuft
Inflow hyd. No.	=	5 - Post Basin 3	Max. Elevation	=	319.74 ft
Reservoir name	=	Basin 3	Max. Storage	=	75,335 cuft

Storage Indication method used.

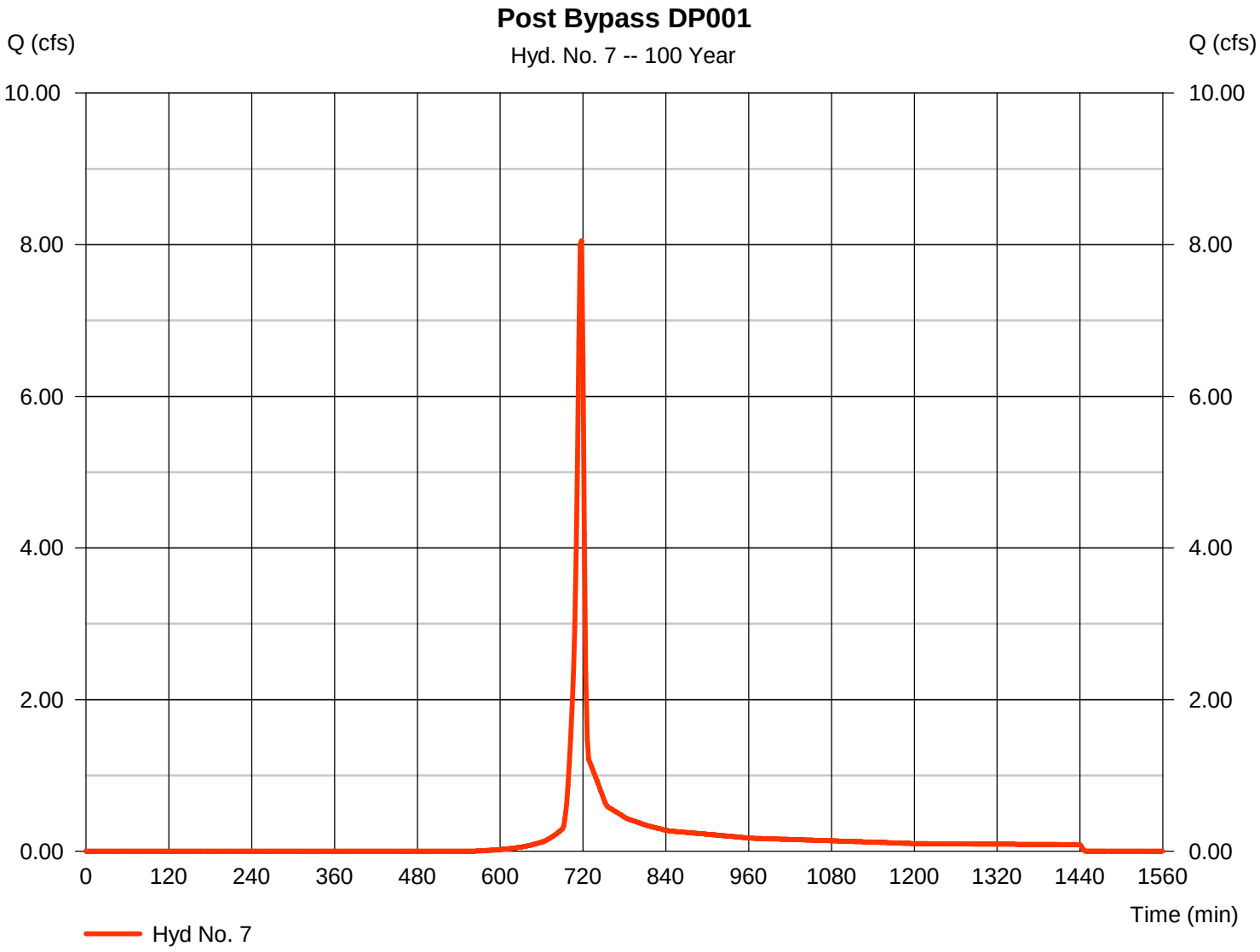


Hydrograph Report

Hyd. No. 7

Post Bypass DP001

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.052 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	16,178 cuft
Drainage area	=	1.440 ac	Curve number	=	63.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

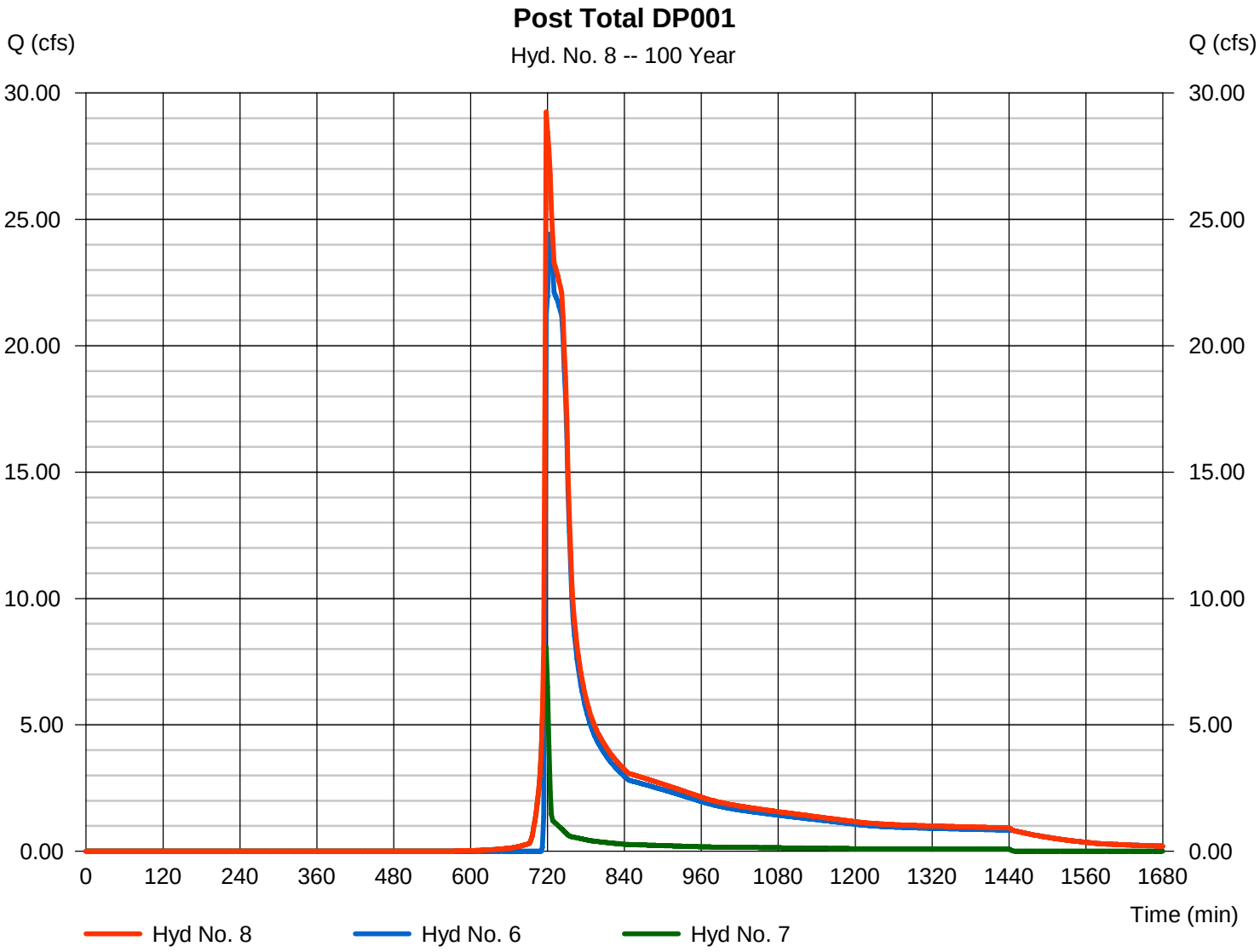


Hydrograph Report

Hyd. No. 8

Post Total DP001

Hydrograph type	=	Combine	Peak discharge	=	29.25 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	150,961 cuft
Inflow hyds.	=	6, 7	Contrib. drain. area	=	1.440 ac

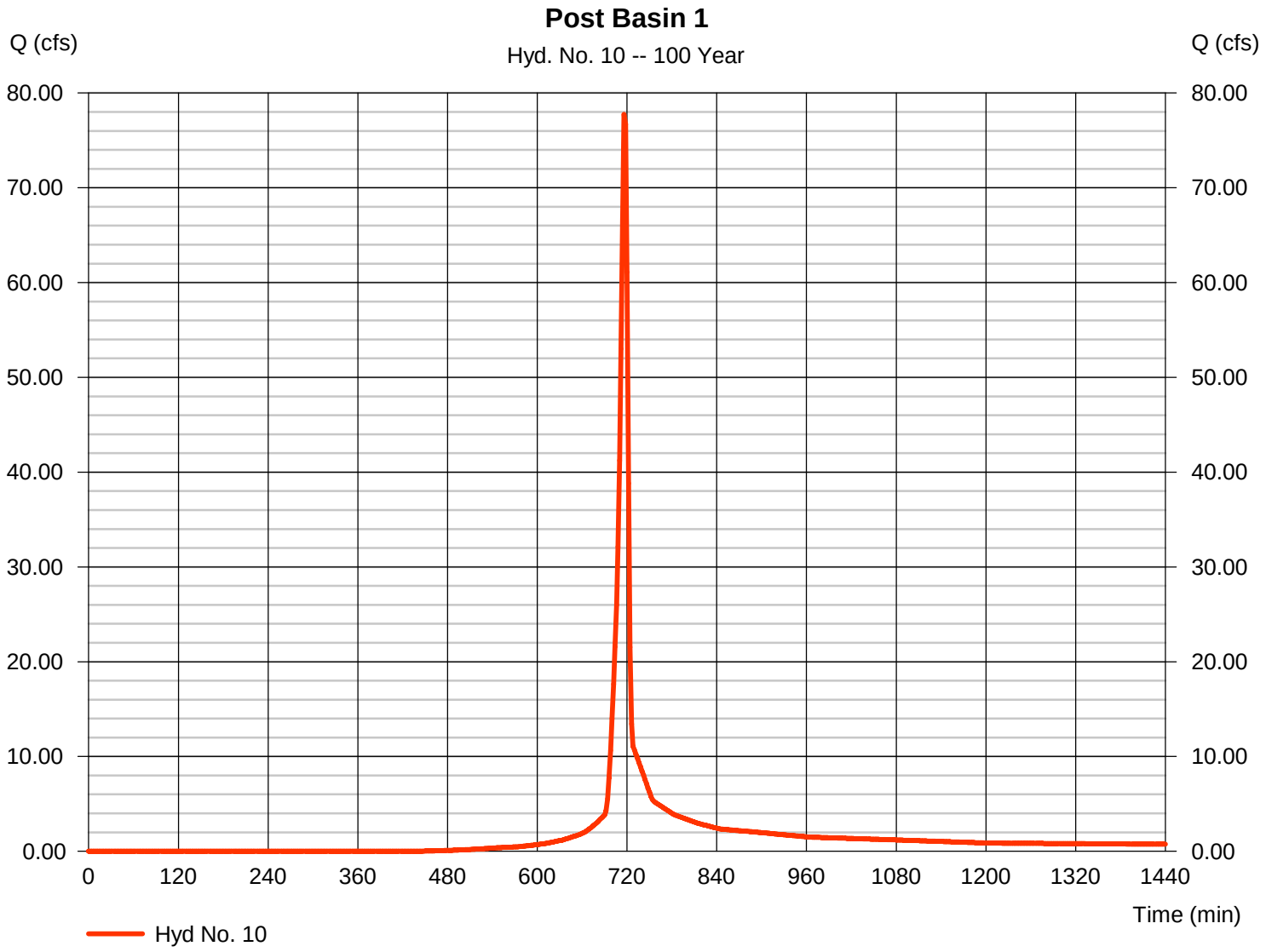


Hydrograph Report

Hyd. No. 10

Post Basin 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	77.75 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	157,867 cuft
Drainage area	=	10.950 ac	Curve number	=	71.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



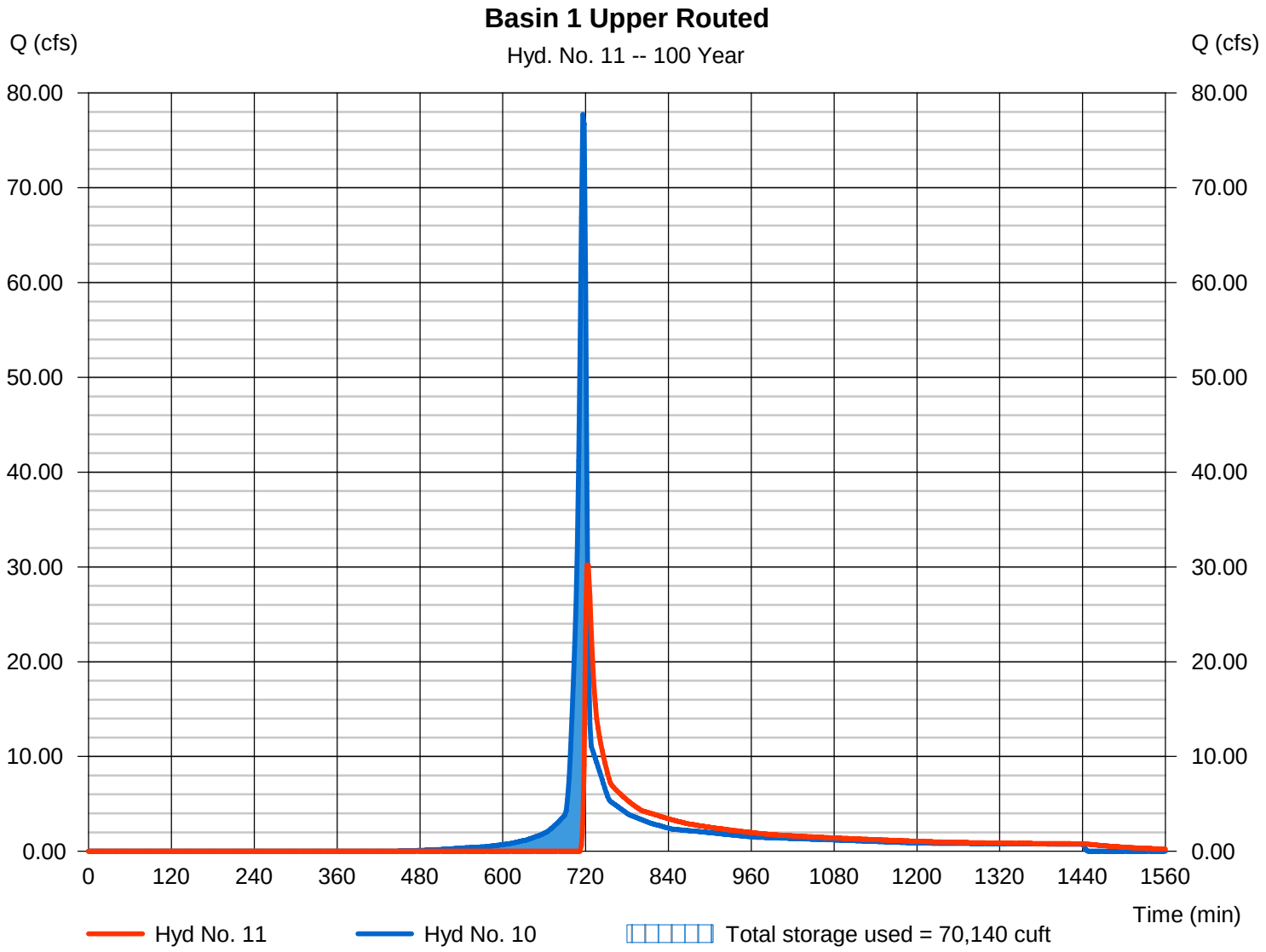
Hydrograph Report

Hyd. No. 11

Basin 1 Upper Routed

Hydrograph type	=	Reservoir	Peak discharge	=	30.18 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	120,378 cuft
Inflow hyd. No.	=	10 - Post Basin 1	Max. Elevation	=	324.12 ft
Reservoir name	=	Basin 1 Upper	Max. Storage	=	70,140 cuft

Storage Indication method used.



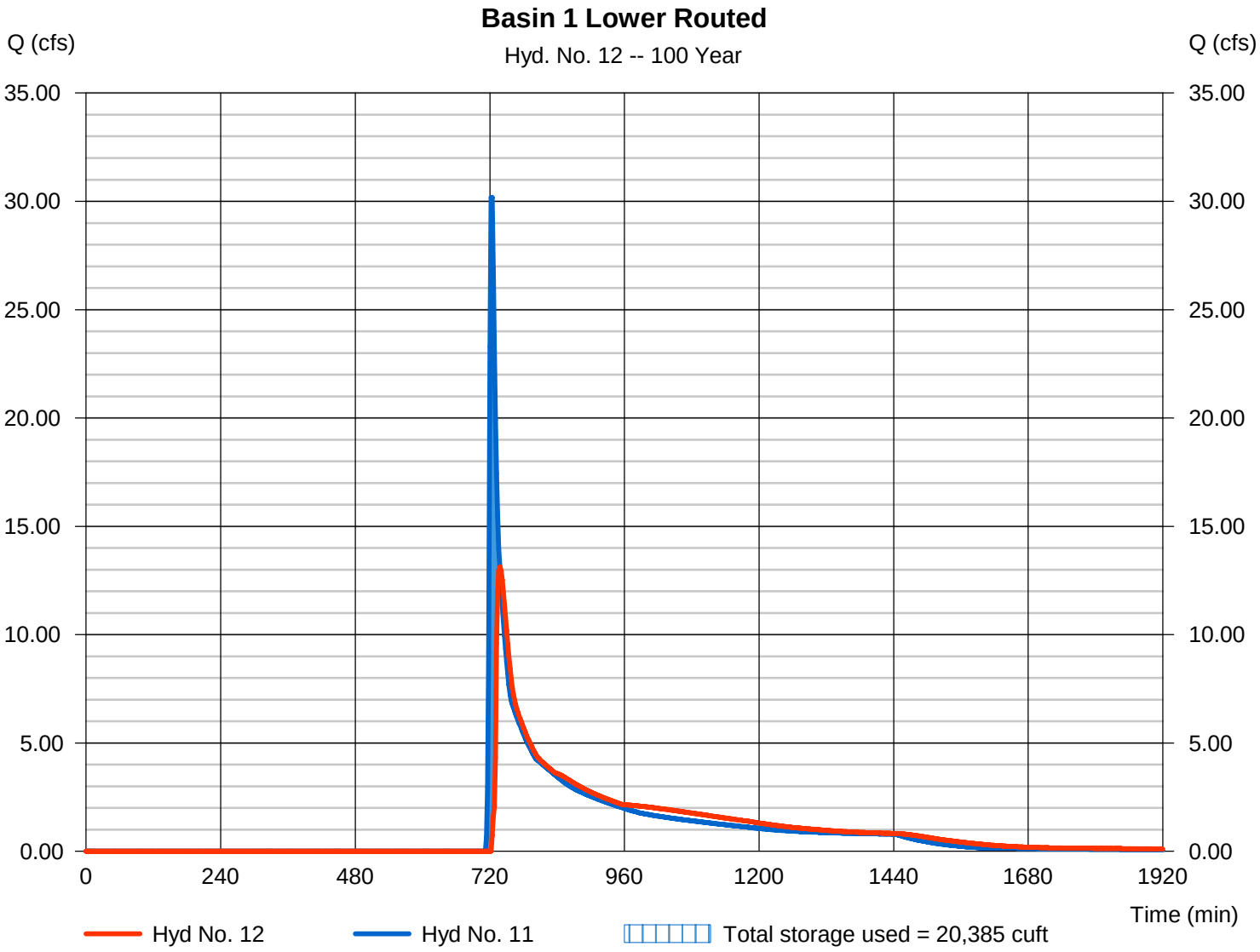
Hydrograph Report

Hyd. No. 12

Basin 1 Lower Routed

Hydrograph type	=	Reservoir	Peak discharge	=	13.13 cfs
Storm frequency	=	100 yrs	Time to peak	=	738 min
Time interval	=	2 min	Hyd. volume	=	114,181 cuft
Inflow hyd. No.	=	11 - Basin 1 Upper Routed	Max. Elevation	=	305.96 ft
Reservoir name	=	Basin 1 Lower	Max. Storage	=	20,385 cuft

Storage Indication method used.

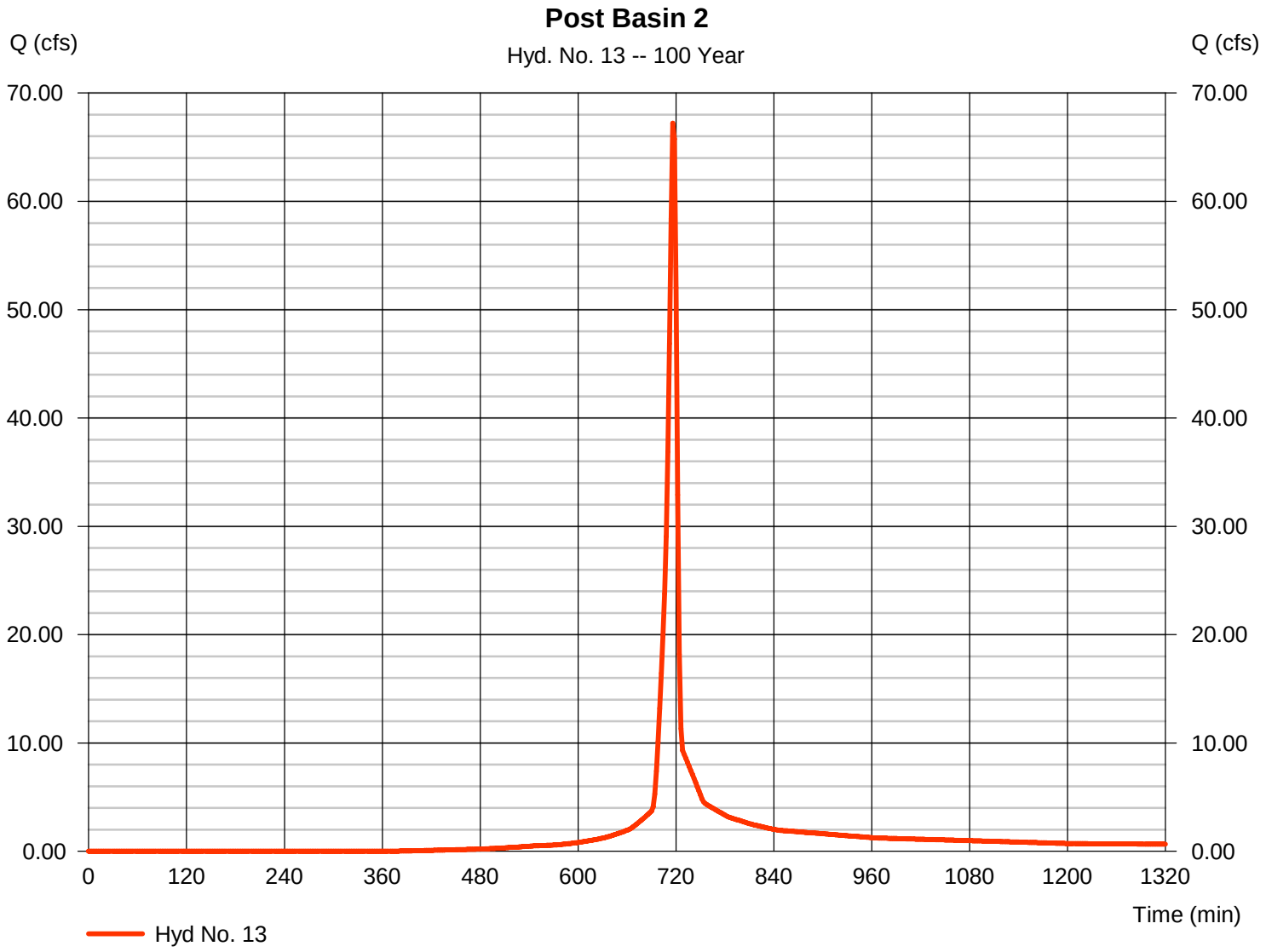


Hydrograph Report

Hyd. No. 13

Post Basin 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	67.22 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	138,052 cuft
Drainage area	=	8.540 ac	Curve number	=	76.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



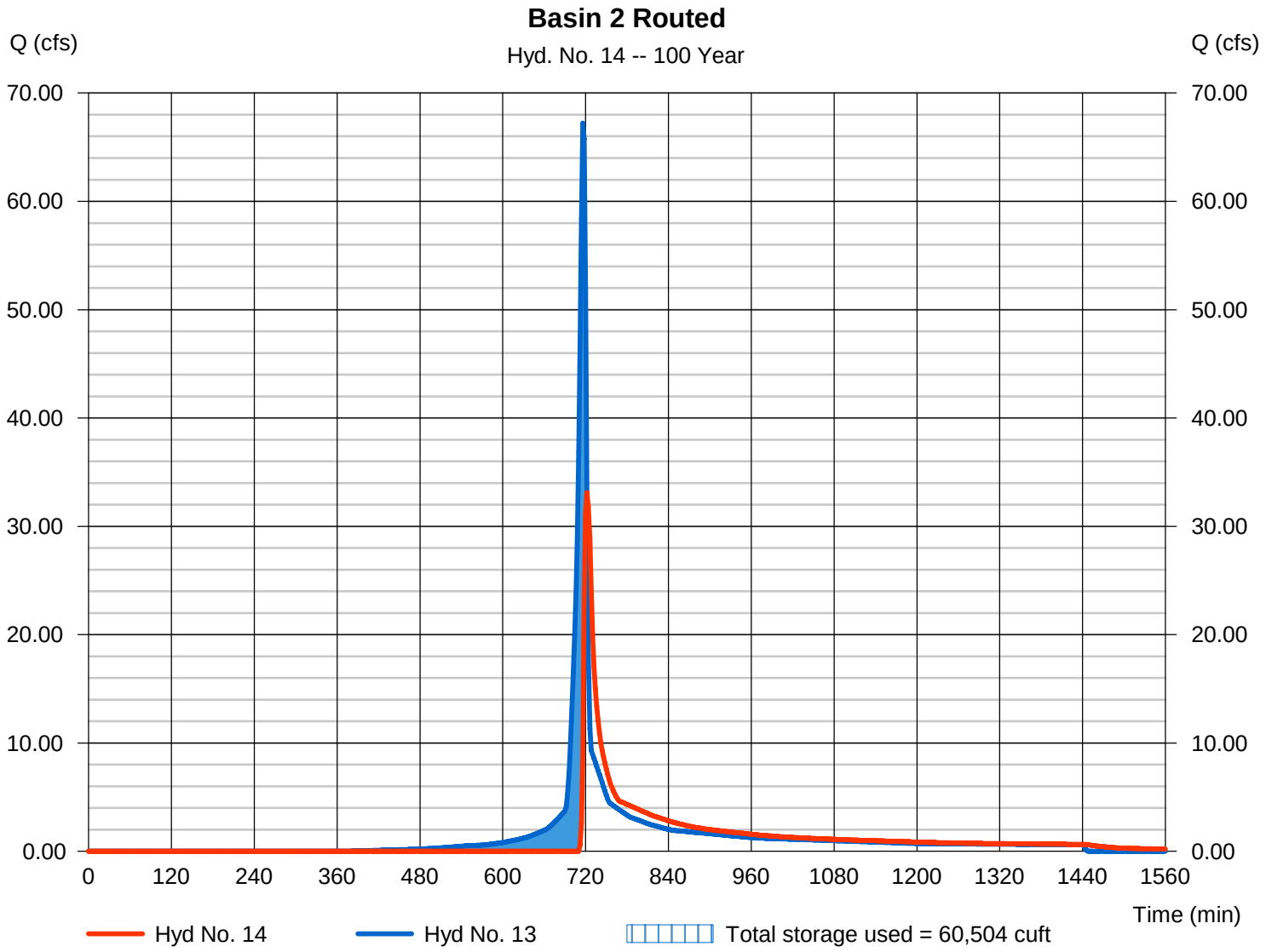
Hydrograph Report

Hyd. No. 14

Basin 2 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	33.12 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	105,698 cuft
Inflow hyd. No.	=	13 - Post Basin 2	Max. Elevation	=	310.57 ft
Reservoir name	=	Basin 2	Max. Storage	=	60,504 cuft

Storage Indication method used.

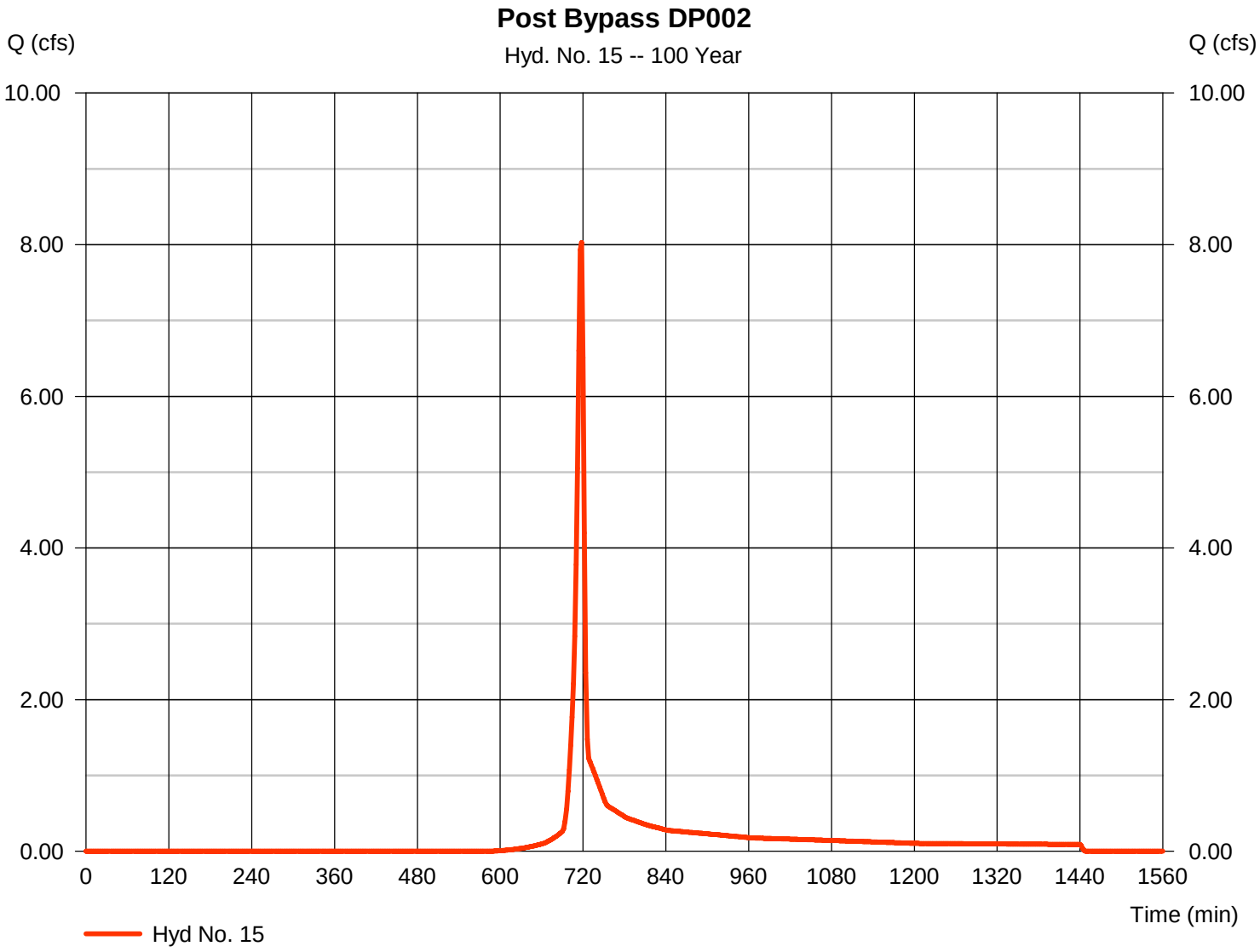


Hydrograph Report

Hyd. No. 15

Post Bypass DP002

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.028 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	16,080 cuft
Drainage area	=	1.540 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

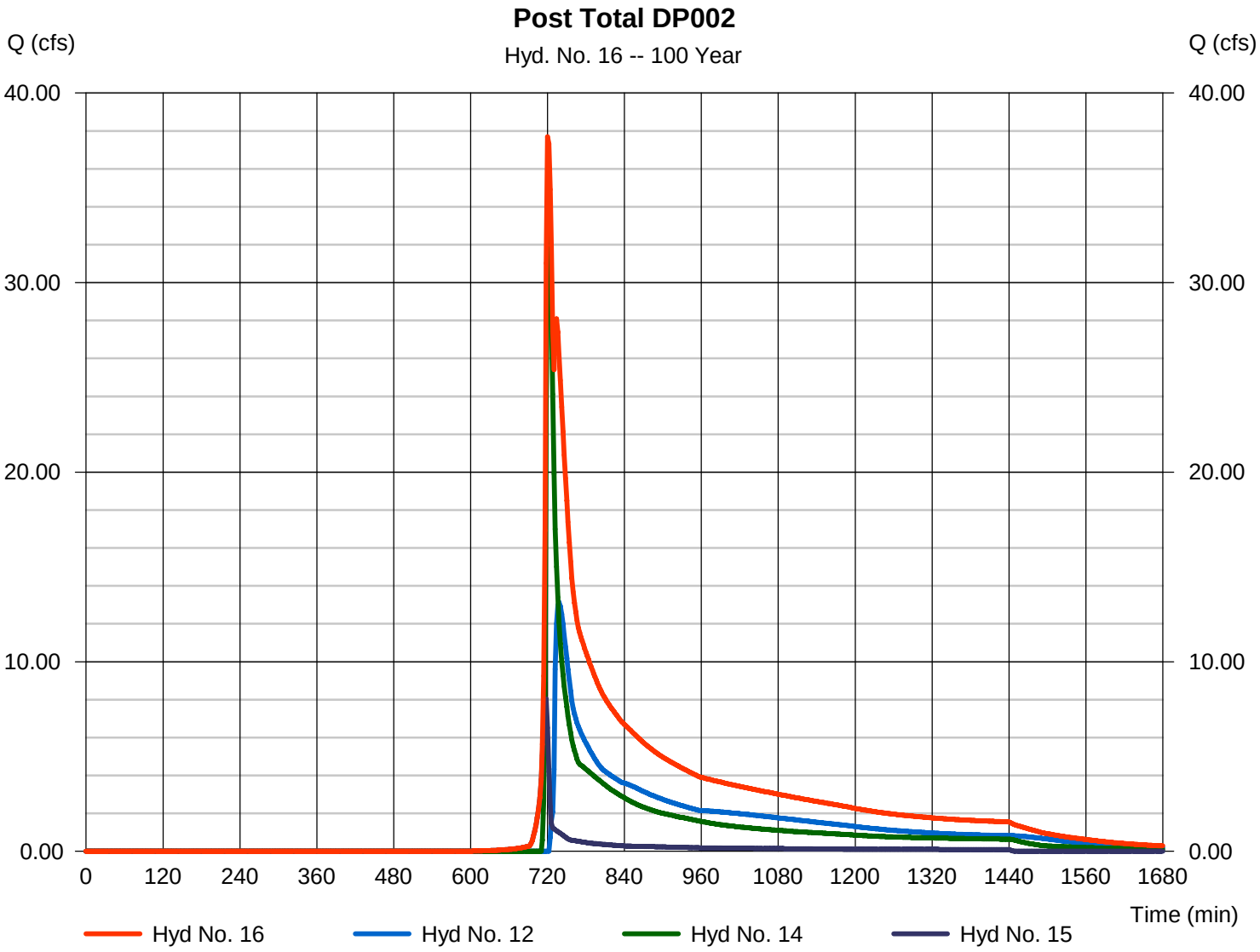


Hydrograph Report

Hyd. No. 16

Post Total DP002

Hydrograph type	=	Combine	Peak discharge	=	37.69 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	235,959 cuft
Inflow hyds.	=	12, 14, 15	Contrib. drain. area	=	1.540 ac



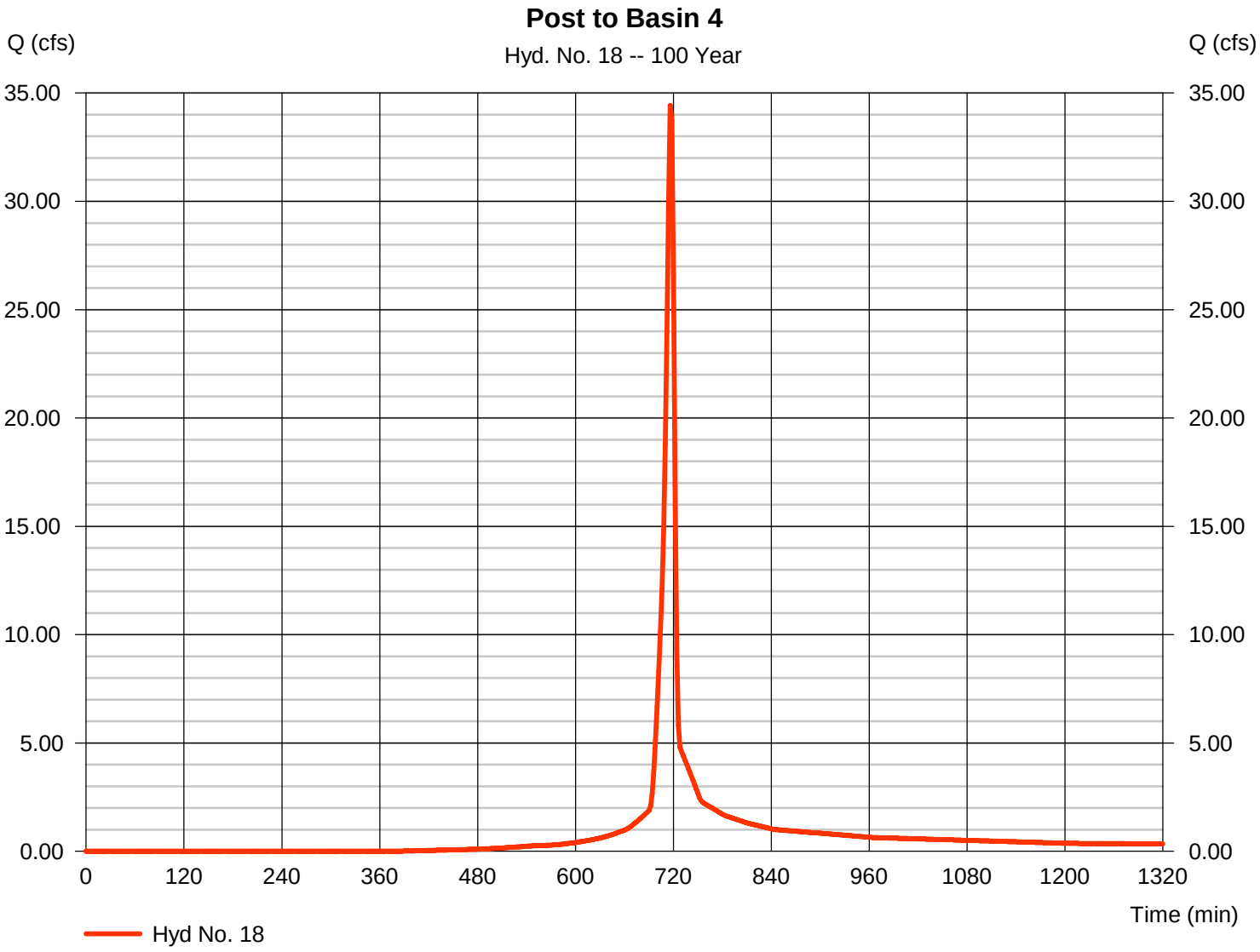
Hydrograph Report

Hyd. No. 18

Post to Basin 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	34.43 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	70,605 cuft
Drainage area	=	4.420 ac	Curve number	=	75.9*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.910 x 61) + (2.270 x 98) + (3.040 x 78)] / 4.420



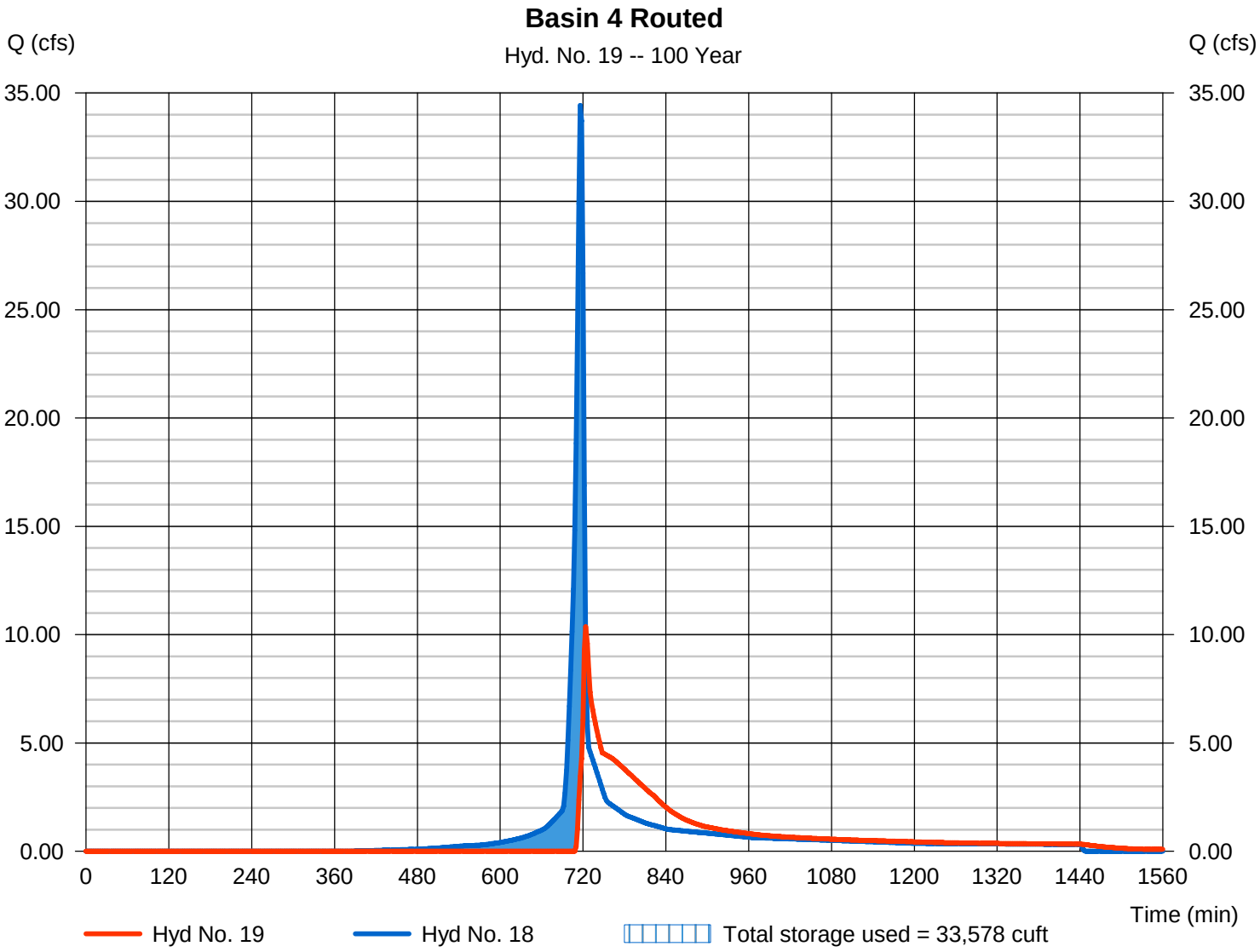
Hydrograph Report

Hyd. No. 19

Basin 4 Routed

Hydrograph type	=	Reservoir	Peak discharge	=	10.36 cfs
Storm frequency	=	100 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	56,799 cuft
Inflow hyd. No.	=	18 - Post to Basin 4	Max. Elevation	=	348.51 ft
Reservoir name	=	Basin 4	Max. Storage	=	33,578 cuft

Storage Indication method used.



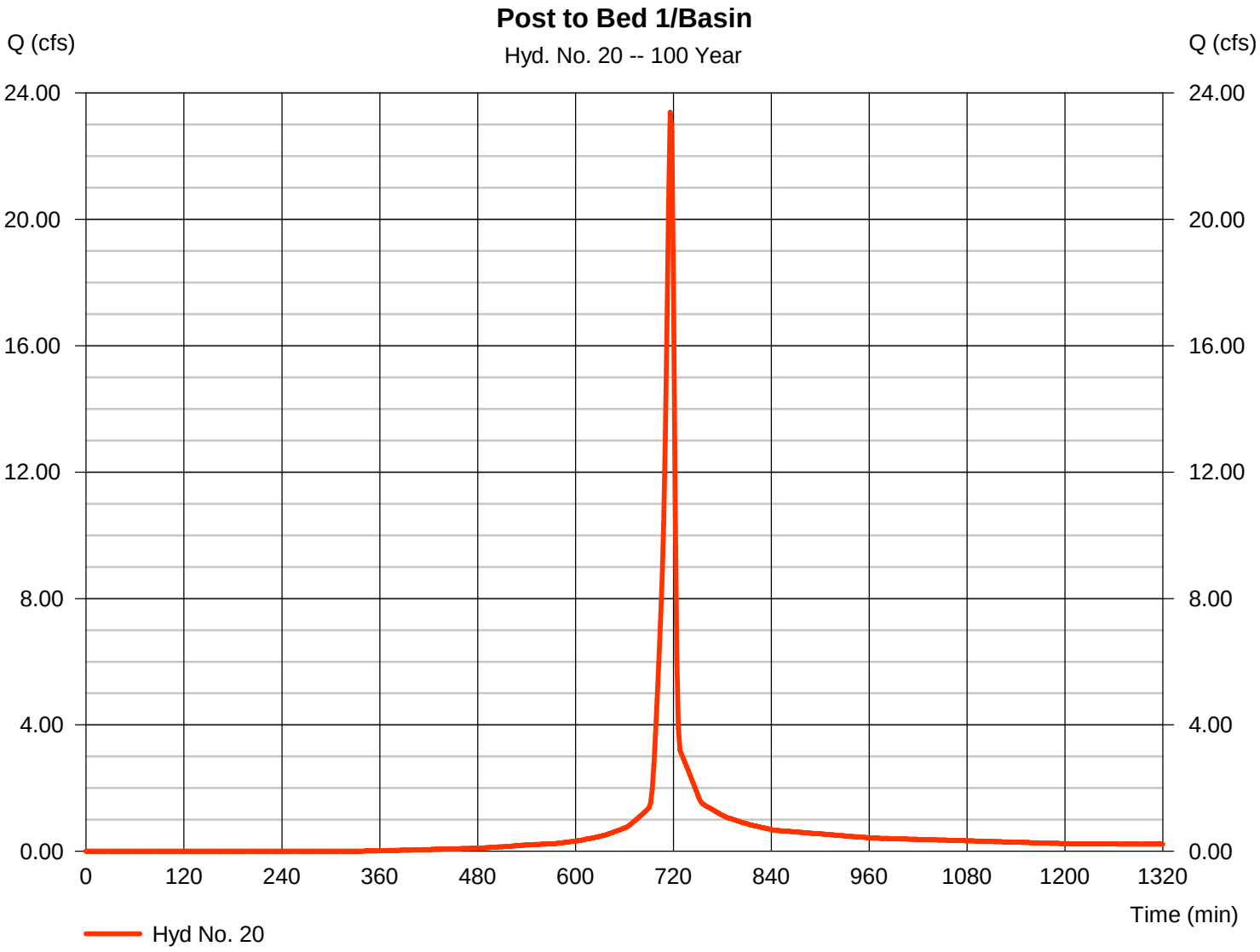
Hydrograph Report

Hyd. No. 20

Post to Bed 1/Basin

Hydrograph type	=	SCS Runoff	Peak discharge	=	23.40 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	48,517 cuft
Drainage area	=	2.820 ac	Curve number	=	79.1*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.910 x 61) + (2.270 x 98) + (3.040 x 78)] / 2.820



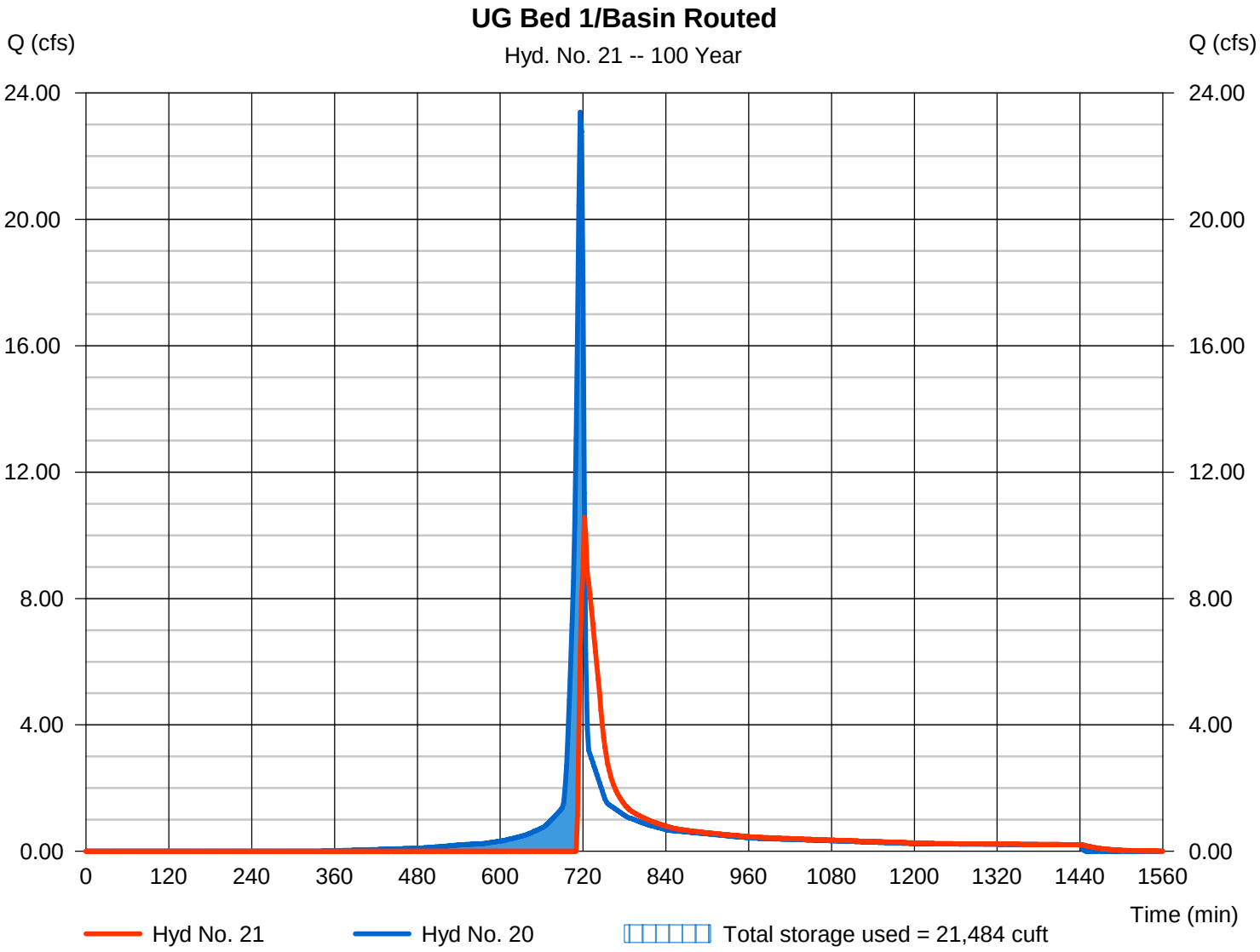
Hydrograph Report

Hyd. No. 21

UG Bed 1/Basin Routed

Hydrograph type	=	Reservoir	Peak discharge	=	10.57 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	36,419 cuft
Inflow hyd. No.	=	20 - Post to Bed 1/Basin	Max. Elevation	=	342.30 ft
Reservoir name	=	UG Bed 1/Basin	Max. Storage	=	21,484 cuft

Storage Indication method used.

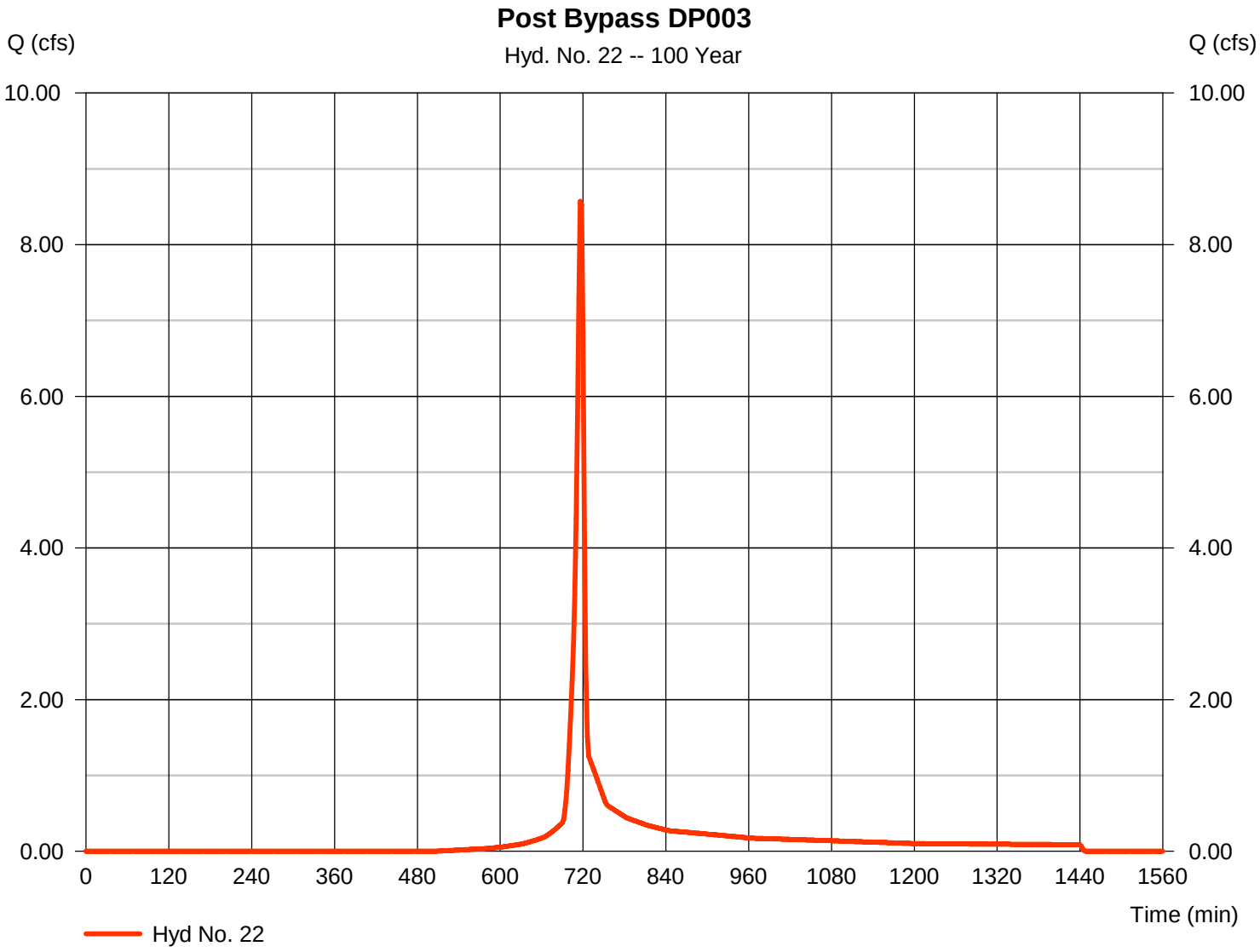


Hydrograph Report

Hyd. No. 22

Post Bypass DP003

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.571 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	17,315 cuft
Drainage area	=	1.340 ac	Curve number	=	67.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	7.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

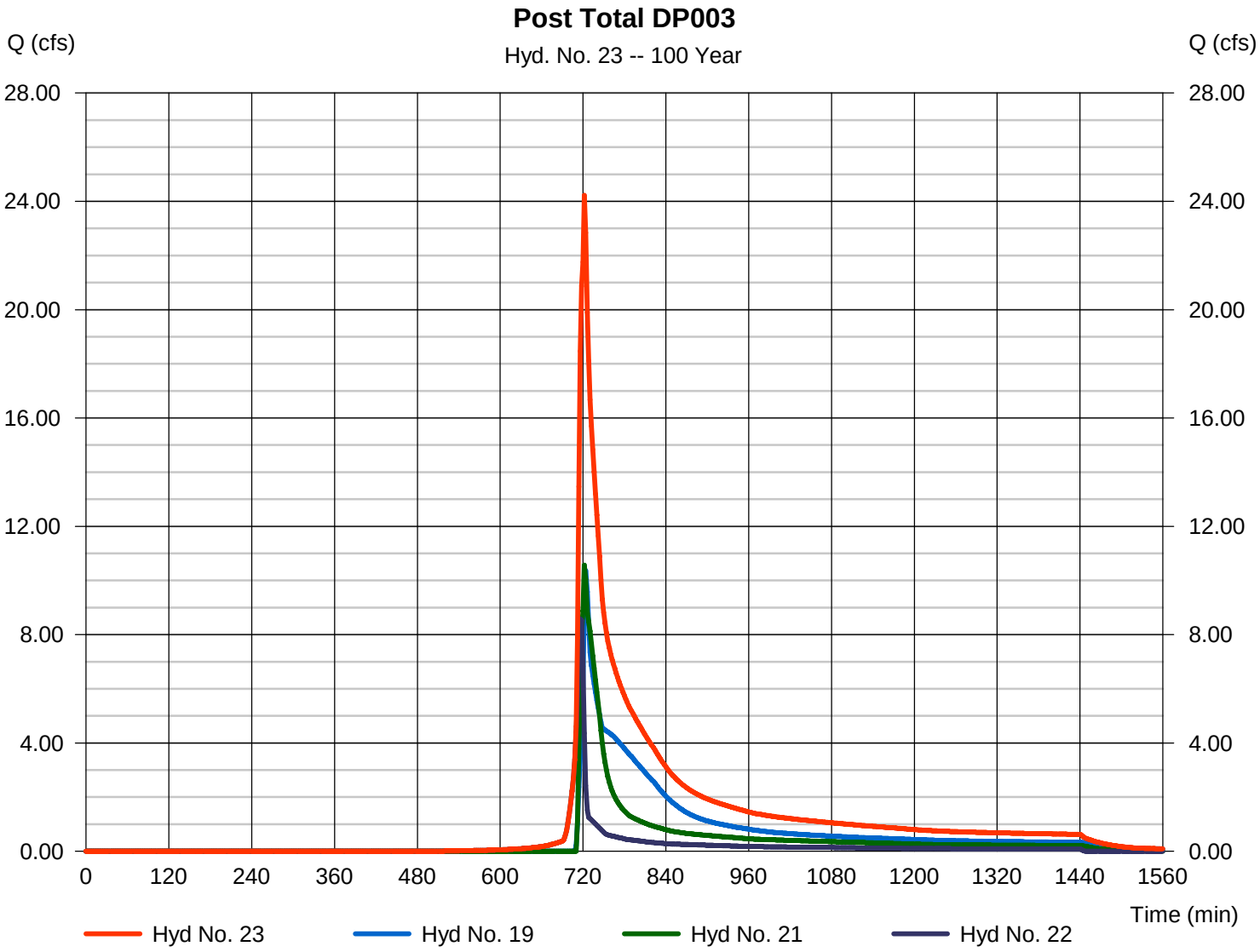


Hydrograph Report

Hyd. No. 23

Post Total DP003

Hydrograph type	=	Combine	Peak discharge	=	24.22 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	110,534 cuft
Inflow hyds.	=	19, 21, 22	Contrib. drain. area	=	1.340 ac



APPENDIX E

USDA NRCS SOIL REPORT

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Chester County, Pennsylvania

Stokes

March 28, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:6,030 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chester County, Pennsylvania
Survey Area Data: Version 13, Jun 5, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 26, 2019—Jul 10, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ba	Baile silt loam	11.2	16.9%
Co	Codorus silt loam	1.1	1.6%
GdB	Gladstone gravelly loam, 3 to 8 percent slopes	6.0	9.1%
GdC	Gladstone gravelly loam, 8 to 15 percent slopes	32.3	49.0%
GfD	Gladstone gravelly loam, 8 to 25 percent slopes, very bouldery	5.5	8.4%
Ha	Hatboro silt loam	6.0	9.1%
MaD	Manor loam, 15 to 25 percent slopes	3.8	5.8%
UrlB	Urban land-Gladstone complex, 0 to 8 percent slopes	0.1	0.1%
Totals for Area of Interest		**66.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit

descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Chester County, Pennsylvania

Ba—Baile silt loam

Map Unit Setting

National map unit symbol: pjb7
Elevation: 200 to 2,000 feet
Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 45 to 61 degrees F
Frost-free period: 110 to 235 days
Farmland classification: Not prime farmland

Map Unit Composition

Baile and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Baile

Setting

Landform: Depressions
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Parent material: Local alluvium over residuum weathered from mica schist

Typical profile

Ap - 0 to 10 inches: silt loam
Btg - 10 to 40 inches: silt loam
Cg - 40 to 60 inches: loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 60 to 99 inches to lithic bedrock
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Glenville

Percent of map unit: 9 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, backslope

Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Hydric soil rating: No

Manor

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Chester

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Glenelg

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Co—Codorus silt loam

Map Unit Setting

National map unit symbol: pjfx
Elevation: 200 to 2,000 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 45 to 57 degrees F
Frost-free period: 120 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Codorus and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Codorus

Setting

Landform: Flood plains

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from gneiss and/or alluvium derived from mica schist

Typical profile

Ap - 0 to 12 inches: silt loam
Bw - 12 to 48 inches: silt loam
C - 48 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 72 to 99 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: OccasionalNone
Frequency of ponding: None
Available water capacity: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Hatboro

Percent of map unit: 8 percent
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Glenville

Percent of map unit: 4 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Hydric soil rating: No

Baile

Percent of map unit: 3 percent
Landform: Depressions
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear

Hydric soil rating: Yes

GdB—Gladstone gravelly loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2v7gk
Elevation: 250 to 1,200 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Gladstone and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gladstone

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy colluvium derived from granite and gneiss and/or loamy residuum weathered from granite and gneiss

Typical profile

Ap - 0 to 10 inches: gravelly loam
Bt1 - 10 to 22 inches: sandy clay loam
Bt2 - 22 to 37 inches: loam
C - 37 to 66 inches: sandy loam
R - 66 to 76 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 60 to 80 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Califon

Percent of map unit: 5 percent
Landform: Flats
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Annandale

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Parker

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

GdC—Gladstone gravelly loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2v7gl
Elevation: 250 to 1,200 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 170 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Gladstone and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gladstone

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope

Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy colluvium derived from granite and gneiss and/or loamy residuum weathered from granite and gneiss

Typical profile

Ap - 0 to 10 inches: gravelly loam
Bt1 - 10 to 22 inches: gravelly sandy clay loam
Bt2 - 22 to 37 inches: gravelly loam
C - 37 to 66 inches: gravelly sandy loam
R - 66 to 76 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 65 to 67 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Parker

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Califon

Percent of map unit: 5 percent
Landform: Flats
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Annandale

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

GfD—Gladstone gravelly loam, 8 to 25 percent slopes, very bouldery

Map Unit Setting

National map unit symbol: wphh
Elevation: 200 to 1,200 feet
Mean annual precipitation: 40 to 48 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 150 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Gladstone, very bouldery, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gladstone, Very Bouldery

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Local colluvium and residuum weathered from granite and gneiss

Typical profile

A - 0 to 10 inches: gravelly loam
Bt - 10 to 42 inches: gravelly clay loam
C - 42 to 68 inches: very gravelly loam
R - 68 to 78 inches: bedrock

Properties and qualities

Slope: 8 to 25 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 60 to 100 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Cokesbury

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Califon

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Ha—Hatboro silt loam

Map Unit Setting

National map unit symbol: 1lwqq
Elevation: 200 to 800 feet
Mean annual precipitation: 36 to 50 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 140 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Hatboro and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hatboro

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Alluvium derived from metamorphic and sedimentary rock

Typical profile

Ap - 0 to 9 inches: silt loam
Bg - 9 to 44 inches: silt loam
Cg - 44 to 56 inches: sandy clay loam
C - 56 to 70 inches: stratified gravelly sand to clay

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 60 to 99 inches to lithic bedrock
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: FrequentNone
Frequency of ponding: None
Available water capacity: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Glenville

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope, head slope
Down-slope shape: Linear, concave
Across-slope shape: Concave, linear
Hydric soil rating: No

MaD—Manor loam, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 2tmcg
Elevation: 250 to 1,000 feet
Mean annual precipitation: 40 to 55 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 150 to 192 days
Farmland classification: Not prime farmland

Map Unit Composition

Manor and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manor

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Side slope

Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from mica schist

Typical profile

A1 - 0 to 2 inches: loam
A2 - 2 to 6 inches: sandy loam
Bw1 - 6 to 13 inches: fine sandy loam
Bw2 - 13 to 22 inches: fine sandy loam
C1 - 22 to 30 inches: fine sandy loam
C2 - 30 to 44 inches: channery coarse sand
C3 - 44 to 53 inches: loamy sand
C4 - 53 to 83 inches: channery loamy sand
Cr - 83 to 108 inches: bedrock
R - 108 to 138 inches: bedrock

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: 59 to 100 inches to paralithic bedrock; 100 to 128 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.07 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Glenville

Percent of map unit: 5 percent
Landform: Drainageways, swales
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Base slope, head slope, interfluve
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Mt. airy

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Blocktown

Percent of map unit: 5 percent

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

UrlB—Urban land-Gladstone complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 1r3cq
Elevation: 200 to 1,200 feet
Mean annual precipitation: 36 to 48 inches
Mean annual air temperature: 44 to 57 degrees F
Frost-free period: 130 to 190 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 65 percent
Gladstone and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Pavement, buildings and other artifically covered areas

Typical profile

C - 0 to 6 inches: variable

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 to 100 inches to lithic bedrock
Available water capacity: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Description of Gladstone

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Nose slope, side slope
Down-slope shape: Linear, convex

Across-slope shape: Linear, convex
Parent material: Local colluvium and residuum weathered from granite and gneiss

Typical profile

A - 0 to 10 inches: gravelly loam
C - 10 to 42 inches: gravelly clay loam
2Ap - 42 to 68 inches: gravelly loam
R - 68 to 78 inches: bedrock

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 60 to 100 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Cokesbury

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Califon

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Head slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

APPENDIX E

STORMWATER INFILTRATION TESTING REPORT

STORMWATER INFILTRATION REPORT

FOR

1013 SHILOH ROAD
WESTTOWN TOWNSHIP
CHESTER COUNTY

PREPARED FOR:

Keystone Custom Homes

PREPARED BY:

D.L. Howell & Associates, Inc.
1250 Wrights Lane
West Chester, PA 19380

March 2021

DLHowell
Civil Engineering & Land Planning
www.DLHowell.com

Stormwater Infiltration Test Report
1013 Shiloh Road
Westtown Township
Chester County

On Monday and Tuesday, March 22-23, 2021, D.L. Howell and Associates, Inc. preformed hydraulic conductivity tests for the proposed stormwater management areas for the property located at 1013 Shiloh Road in Westtown Township, Chester County. The purpose of the hydraulic conductivity testing was to determine site suitability for the proposed stormwater infiltration areas associated with proposed improvements at the site (see development plan).

Testing was conducted in general accordance with the Pennsylvania Department of Environmental Protection (PADEP)'s Pennsylvania Stormwater Best Management Practices Manual specifications, in a cased, sealed, borehole utilizing the falling head method designed to measure the vertical hydraulic conductivity of the soil. An approximate five-inch diameter borehole was hand dug to the depth of the proposed bottom elevation of the infiltration structure and a 3-inch diameter PVC casing was installed. A mixture of bentonite and soil was placed around the annulus of the casing and packed to seal the casing in place. The casing was presoaked immediately prior to the start of the test to simulate field saturated conditions. A measured amount of water was poured into the sealed casing to begin the 30-minute presoak. After the final 30-minute presoaking period, the water in the casing was adjusted to a known depth and consecutively re-adjusted after each reading and the drop of the water column is measured. The test continued until the readings became stabilized or for a maximum of eight readings. A stabilized rate of drop means a difference of ¼ inch or less of drop between the highest and lowest readings of four consecutive readings.

Within the site, four hydraulic conductivity tests were conducted at the elevations associated with the proposed bottom of the infiltration structures. One deep test pit was excavated at each infiltration test location to identify limiting conditions such as mottling, depth of bedrock, and depth of groundwater. Testing was to be conducted within the footprint of the proposed infiltration structures.

- Infiltration Test 3-23-1 was conducted at approximately ± 5.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 317.0. One deep test pit was excavated at this location to a depth of 7.0 feet below existing grade. During excavation, rock was encountered at a depth of approximately 7.0 feet below existing grade.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-23-1: an infiltration rate of 1.50 inches per hour shall be used.

- Infiltration Test 3-23-2 was conducted at approximately ± 4.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 314.0. One deep test pit was excavated at this location to a depth of 6.0 feet below existing grade. No limiting conditions were identified at the time of excavation.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-23-2: an infiltration rate of 1.14 inches per hour shall be used.

- Infiltration Test 3-23-3 was conducted at approximately ± 3.5 feet below existing grade, which corresponds to an approximate infiltration elevation of 303.5. One deep test pit was excavated at this location to a depth of 5.5 feet below existing grade. During excavation, rock was encountered at a depth of approximately 5.5 feet below existing grade.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-23-3: an infiltration rate of 1.68 inches per hour shall be used.

- Infiltration Test 3-23-4 was conducted at approximately ± 5.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 298.0. One deep test pit was excavated at this location to a depth of 7.0 feet below existing grade. During excavation, groundwater was encountered at a depth of approximately 7.0 feet below existing grade.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-23-4: an infiltration rate of 1.96 inches per hour shall be used.

- Infiltration Test 3-22-5 was conducted at approximately ± 6.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 334.0. One deep test pit was excavated at this location to a depth of 8.0 feet below existing grade. No limiting conditions were encountered at the time of excavation.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-22-5: an infiltration rate of 2.81 inches per hour shall be used.

- Infiltration Test 3-22-6 was conducted at approximately ± 2.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 306.0. One

deep test pit was excavated at this location to a depth of 6.0 feet below existing grade. No limiting conditions were encountered at the time of excavation.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-22-6: an infiltration rate of 2.93 inches per hour shall be used.

- Infiltration Test 3-22-7 was conducted at approximately ± 2.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 336.0. One deep test pit was excavated at this location to a depth of 4.0 feet below existing grade. During excavation, rock was encountered at a depth of approximately 4.0 feet below existing grade.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-22-7: an infiltration rate of 0.88 inches per hour shall be used.

- Infiltration Test 3-22-8 was conducted at approximately ± 2.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 314.0. One deep test pit was excavated at this location to a depth of 4.0 feet below existing grade. During excavation, rock was encountered at a depth of approximately 4.0 feet below existing grade.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, D.L. Howell & Associates, Inc., recommends the following infiltration rate for the soils underlying Test 3-22-8: an infiltration rate of 0.43 inches per hour shall be used.

Please reference plan drawings for exact locations and visual representation of infiltration tests and test pits. Results of the hydraulic conductivity testing and soil horizon descriptions can be found in the enclosed attachments.

Hydraulic Conductivity Calculation

Coefficient of Permeability: $K = [A/(F*D*t)] \times \ln (h1 / h2)$

Where:
K = permeability (inches per hour)
A = cross sectional area of cased hole
F = shape factor (2.75 constant of flat bottom)
D = cased hole diameter
t = time for head change from h1 to h2
h1 = initial height of water column in casing
h2 = final height of water column in casing

*Reference *Soil Hydraulic Conductivity Analysis Form* for infiltration testing data and *Soil Morphology Form* for soil profile data.

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Stormwater Infiltration Testing &

Hydraulic Conductivity Calculations

JOB NO.: 3868 **DATE:** 3/22/2021
LOCATION: 1013 Shiloh Road **BY:** DD
MUNICIPALITY: Westtown Township, Chester County, Pa.
DESCRIPTION: Stormwater Infiltration Testing

Field Test Results

WEATHER CONDITIONS: SUNNY **TEMPERATURE:** 62 °F
PRECIPITATION IN LAST 24 HOURS: None

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-22-5	72									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		15.00	14.75	14.75	14.50	14.50	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-22-6	24									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		15.25	15.00	14.75	14.75	14.75	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Determination of Hydraulic Conductivity (Kv)

$$Kv = [\ A/(F*D*t)\ ] * \ln(h1/h2)$$

		Test 3-22-5 Results		Test 3-22-6 Results	
Kv =	***Vertical Permeability***	**2.8062**	**(in/hour)**	**2.93319**	**(in/hour)**
A =	***Cross-sectional area of cased hole***	7.06858	(Sq.in.)	7.06858	(Sq.in.)
F =	***shape factor (2.75 constant for flat bottom)***	2.75	(Units)	2.75	(Units)
D =	***cased hole diameter***	3	(Inches)	3	(Inches)
t =	***time for head to change from h1 to h2***	0.5	(hrs.)	0.5	(hrs.)
h1 =	***initial height of water column in casing***	18	(Inches)	18	(Inches)
h2 =	***final height of water column in casing***	3.50	(Inches)	3.25	(Inches)

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Stormwater Infiltration Testing &

Hydraulic Conductivity Calculations

JOB NO.: 3868 **DATE:** 3/22/2021
LOCATION: 1013 Shiloh Road **BY:** DD
MUNICIPALITY: Westtown Township, Chester County, Pa.
DESCRIPTION: Stormwater Infiltration Testing

Field Test Results

WEATHER CONDITIONS: SUNNY **TEMPERATURE:** 62 °F
PRECIPITATION IN LAST 24 HOURS: None

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-22-7	24									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		7.25	7.25	7.25	7.25	7.25	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-22-8	24									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		4.25	4.00	4.00	4.00	4.00	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Determination of Hydraulic Conductivity (Kv)

$$Kv = [\ A/(F*D*t)\ ] * \ln(h1/h2)$$

		Test 3-22-7 Results		Test 3-22-8 Results	
Kv =	***Vertical Permeability***	**0.8833**	**(in/hour)**	**0.43065**	**(in/hour)**
A =	***Cross-sectional area of cased hole***	7.06858	(Sq.in.)	7.06858	(Sq.in.)
F =	***shape factor (2.75 constant for flat bottom)***	2.75	(Units)	2.75	(Units)
D =	***cased hole diameter***	3	(Inches)	3	(Inches)
t =	***time for head to change from h1 to h2***	0.5	(hrs.)	0.5	(hrs.)
h1 =	***initial height of water column in casing***	18	(Inches)	18	(Inches)
h2 =	***final height of water column in casing***	10.75	(Inches)	14.00	(Inches)

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Stormwater Infiltration Testing &

Hydraulic Conductivity Calculations

JOB NO.: 3868 **DATE:** 3/23/2021
LOCATION: 1013 Shiloh Road **BY:** DD
MUNICIPALITY: Westtown Township, Chester County, Pa.
DESCRIPTION: Stormwater Infiltration Testing

Field Test Results

WEATHER CONDITIONS: SUNNY **TEMPERATURE:** 64 °F
PRECIPITATION IN LAST 24 HOURS: None

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-23-1	60									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		11.75	10.50	10.50	10.50	10.50	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-23-2	48									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		10.50	8.75	8.75	8.75	8.75	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Determination of Hydraulic Conductivity (Kv)

$$Kv = [\ A/(F*D*t)\ ] * \ln(h1/h2)$$

		Test 3-23-1 Results		Test 3-23-2 Results	
Kv =	***Vertical Permeability***	**1.5002**	**(in/hour)**	**1.14082**	**(in/hour)**
A =	***Cross-sectional area of cased hole***	7.06858	(Sq.in.)	7.06858	(Sq.in.)
F =	***shape factor (2.75 constant for flat bottom)***	2.75	(Units)	2.75	(Units)
D =	***cased hole diameter***	3	(Inches)	3	(Inches)
t =	***time for head to change from h1 to h2***	0.5	(hrs.)	0.5	(hrs.)
h1 =	***initial height of water column in casing***	18	(Inches)	18	(Inches)
h2 =	***final height of water column in casing***	7.50	(Inches)	9.25	(Inches)

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Stormwater Infiltration Testing &

Hydraulic Conductivity Calculations

JOB NO.: 3868 **DATE:** 3/23/2021
LOCATION: 1013 Shiloh Road **BY:** DD
MUNICIPALITY: Westtown Township, Chester County, Pa.
DESCRIPTION: Stormwater Infiltration Testing

Field Test Results

WEATHER CONDITIONS: SUNNY **TEMPERATURE:** 64 °F
PRECIPITATION IN LAST 24 HOURS: None

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-23-3	42									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		11.75	11.25	11.25	11.25	11.25	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-23-4	60									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		12.25	12.25	12.25	12.25	12.25	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Determination of Hydraulic Conductivity (Kv)

$$Kv = [\ A/(F*D*t)\ ] * \ln(h1/h2)$$

		Test 3-23-3 Results		Test 3-23-4 Results	
Kv =	***Vertical Permeability***	**1.68075**	**(in/hour)**	**1.95551**	**(in/hour)**
A =	***Cross-sectional area of cased hole***	7.06858	(Sq.in.)	7.06858	(Sq.in.)
F =	***shape factor (2.75 constant for flat bottom)***	2.75	(Units)	2.75	(Units)
D =	***cased hole diameter***	3	(Inches)	3	(Inches)
t =	***time for head to change from h1 to h2***	0.5	(hrs.)	0.5	(hrs.)
h1 =	***initial height of water column in casing***	18	(Inches)	18	(Inches)
h2 =	***final height of water column in casing***	6.75	(Inches)	5.75	(Inches)

Soil Morphology Form

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PIT NUMBER: TP 3-23-1 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/23/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	11	A	W	10 YR 4/2	SILT LOAM	0				GRAN	FRI		
	11	46	A	W	10 YR 5/6	SILTY CLAY	0				MA	FIRM		
	46	84			VAR	SANDY SILT	0				GRAN	LO		

COMMENTS: This Deep Test Pit was conducted at Test 3-23-1. During excavation, rock was encountered at a depth of approximately 84 inches below existing grade.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION: Rock	Excessively Drained	Somewhat Poorly Drained	
Type: Water **Rock** Mottling	**Well Drained**	Poorly Drained	
Depth: ~84"	Moderately Well Drained	Very Poorly Drained	

WEATHER: 64° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 84"
COVER: Meadow LANDSCAPE POSITION: SW

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

1250 Wrights Lane
West Chester, PA 19380
P: (610) 918-9002
F: (610) 918-9003

Soil Morphology Form

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PIT NUMBER: TP 3-23-2 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/23/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	9	A	W	10 YR 4/2	SILT LOAM	0				GRAN	FRI		
	9	35	A	IR	10 YR 5/6	SILTY CLAY	0				MA	FIRM		
	35	72			VAR	SANDY SILT	0				GRAN	FRI		

COMMENTS: This Deep Test Pit was conducted at Test 3-23-2. No limiting conditions were identified at the time of excavation.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION:	Excessively Drained	Somewhat Poorly Drained	
Type: Water Rock Mottling	**Well Drained**	Poorly Drained	
Depth: +72"	Moderately Well Drained	Very Poorly Drained	

WEATHER: 64° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 72"
COVER: Meadow LANDSCAPE POSITION: S

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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West Chester, PA 19380
P: (610) 918-9002
F: (610) 918-9003

Soil Morphology Form

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PIT NUMBER: TP 3-23-3 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/23/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	11	A	W	10 YR 4/2	SILT LOAM	0				GRAN	FRI		
	11	47	A	W	10 YR 5/6	SILTY CLAY	0				MA	FIRM		
	47	66			10 YR 3/4	STONY SILT	<20				GRAN	LO		

COMMENTS: This Deep Test Pit was conducted at Test 3-23-1. During excavation, rock was encountered at a depth of approximately 66 inches below existing grade.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION: Rock	Excessively Drained	Somewhat Poorly Drained	
Type: Water **Rock** Mottling	**Well Drained**	Poorly Drained	
Depth: ~66"	Moderately Well Drained	Very Poorly Drained	

WEATHER: 64° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 66"
COVER: Meadow LANDSCAPE POSITION: S

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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West Chester, PA 19380
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F: (610) 918-9003

Soil Morphology Form

DLHowell
Civil Engineering & Land Planning
www.DLHowell.com

PIT NUMBER: TP 3-23-4 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/23/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	8	A	W	10 YR 4/2	SILT LOAM	0				GRAN	FRI		
	8	31	A	W	10 YR 4/4	SILTY CLAY	0				MA	FIRM		
	31	47	G	W	10 YR 6/4	SILT LOAM	0				MA	FRI		
	47	84			VAR	SANDY SILT					GRAN	LO		

COMMENTS: This Deep Test Pit was conducted at Test 3-23-4. During excavation, groundwater was encountered at a depth of approximately 84 inches below existing grade.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION: Groundwater	Excessively Drained	Somewhat Poorly Drained	
Type: **Water** **Rock** Mottling	**Well Drained**	Poorly Drained	
Depth: ~84"	Moderately Well Drained	Very Poorly Drained	

WEATHER: 64° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 84"
COVER: Meadow LANDSCAPE POSITION: S

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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Soil Morphology Form

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PIT NUMBER: TP 3-22-1 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/22/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	5	A	W	10 YR 4/2	SILT LOAM	0				SBK	FRI		
	5	50	A	W	7.5 YR 4/3	SILTY CLAY	0				MA	FIRM		
	50	96			VAR	SILT LOAM	0				GRAN	FRI		

COMMENTS: This Deep Test Pit was conducted at Test 3-22-5. No limiting conditions were identified at the time of excavation.

SOIL TYPE:	Soil Drainage Class:	Soil Scientist Signature:
LIMITING CONDITION:	Excessively Drained Somewhat Poorly Drained	
Type: Water Rock Mottling	Well Drained **Poorly Drained**	
Depth: +96"	Moderately Well Drained Very Poorly Drained	

WEATHER: 62° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 96"
COVER: Meadow LANDSCAPE POSITION: SW

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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Soil Morphology Form

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PIT NUMBER: TP 3-22-6 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/22/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	7	A	W	10 YR 4/2	SILT LOAM	0				MA	FRI		
	7	35	A	W	10 YR 4/3	SILTY CLAY	0				MA	FIRM		
	35	72			VAR	SANDY SILT	0				GRAN	FRI		

COMMENTS: This Deep Test Pit was conducted at Test 3-22-6. No limiting conditions were identified at the time of excavation.

SOIL TYPE:	Soil Drainage Class:	Soil Scientist Signature:
LIMITING CONDITION: Rock	Excessively Drained Somewhat Poorly Drained	
Type: Water **Rock** Mottling	Well Drained **Poorly Drained**	
Depth: ~84"	Moderately Well Drained Very Poorly Drained	

WEATHER: 62° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 84"
COVER: Meadow LANDSCAPE POSITION: SW

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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Soil Morphology Form

DLHowell
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PIT NUMBER: TP 3-22-7 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/22/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	4	A	W	10 YR 4/2	SILT LOAM	0				GRAN	FRI		
	4	48			10 YR 5/4	STONY SILT	<20				GRAN	FRI		

COMMENTS: This Deep Test Pit was conducted at Test 3-22-7. During excavation, rock was encountered at a depth of approximately 48 inches below existing grade.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION: Rock	Excessively Drained	Somewhat Poorly Drained	
Type: Water **Rock** Mottling	Well Drained	Poorly Drained	
Depth: ~48"	**Moderately Well Drained**	Very Poorly Drained	

WEATHER: 62° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 48"
COVER: Meadow LANDSCAPE POSITION: NE

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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Soil Morphology Form

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PIT NUMBER: TP 3-22-8 DLH NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/22/2021 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: STOKES ESTATE SITE LOCATION: 1013 SHILOH ROAD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	3	A	W	10 YR 3/1	SILT LOAM	0				GRAN	FRI		
	3	11	A	W	2.5 Y 5/3	SILTY CLAY	0				MA	FRI		
	11	31	G	W	10 YR 5/6	SILTY CLAY	0				MA	FRI		
	31	48			10 YR 4/4	STONY SILT	<20				GRAN	FRI		

COMMENTS: This Deep Test Pit was conducted at Test 3-22-8. During excavation, rock was encountered at a depth of approximately 48 inches below existing grade.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION: Rock	Excessively Drained	Somewhat Poorly Drained	
Type: Water **Rock** Mottling	Well Drained	Poorly Drained	
Depth: ~48"	**Moderately Well Drained**	Very Poorly Drained	

WEATHER: 62° Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 48"
COVER: Woodlands LANDSCAPE POSITION: NE

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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STORMWATER INFILTRATION REPORT

FOR

1007, 1011, 1013 SHILOH ROAD
WESTTOWN TOWNSHIP
CHESTER COUNTY

PREPARED FOR:

Keystone Custom Homes
227 Granite Run Drive, Suite 100
Lancaster, PA 17601

PREPARED BY:

Howell Engineering
1250 Wrights Lane
West Chester, PA 19380

February 2023

HOWELL ENGINEERING
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Stormwater Infiltration Test Report
1007, 1011, 1013 Shiloh Road
Westtown Township
Chester County

On Wednesday-Thursday, February 1-2, 2023, Howell Engineering preformed hydraulic conductivity tests for the proposed stormwater management areas for the properties located at 1107, 1011, and 1013 Shiloh Road in Westtown Township, Chester County. The purpose of the hydraulic conductivity testing was to determine site suitability for the proposed stormwater infiltration area associated with proposed improvements at the site (see development plan).

Testing was conducted in general accordance with the Pennsylvania Department of Environmental Protection (PADEP)'s Pennsylvania Stormwater Best Management Practices Manual specifications, in a cased, sealed, borehole utilizing the falling head method designed to measure the vertical hydraulic conductivity of the soil. An approximate five-inch diameter borehole was hand dug to the depth of the proposed bottom elevation of the infiltration structure and a 3-inch diameter PVC casing was installed. A mixture of bentonite and soil was placed around the annulus of the casing and packed to seal the casing in place. The casing was presoaked immediately prior to the start of the test to simulate field saturated conditions. A measured amount of water was poured into the sealed casing to begin the 30-minute presoak. After the final 30-minute presoaking period, the water in the casing was adjusted to a known depth and consecutively re-adjusted after each reading and the drop of the water column is measured. The test continued until the readings became stabilized or for a maximum of eight readings. A stabilized rate of drop means a difference of ¼ inch or less of drop between the highest and lowest readings of four consecutive readings.

On lot 1007 Shiloh Road (Obrien property), one hydraulic conductivity test was conducted within the proposed infiltration area at the elevation associated with the proposed bottom of the infiltration structure. One deep test pit was excavated at this infiltration test to identify limiting conditions such as mottling, depth of bedrock, and depth of groundwater. Testing was to be conducted within the footprint of the proposed infiltration structure.

- Infiltration Test 2-1-1 was conducted at approximately ± 6.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 336.50. One deep test pit was excavated at this location to a depth of 9.0 feet below existing grade. During excavation, redoximorphic features were identified between 6-54 inches below existing grade. It is the opinion of Howell Engineering the observed redox was a result of variable permeability within that specific soil horizon and not an indication of a seasonably high water table.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, Howell Engineering recommends the following infiltration rate for the soils underlying Test 2-1-1: an infiltration rate of 0.15 inches per hour shall be used.

On lot 1011 Shiloh Road (Galilea property), one hydraulic conductivity test was conducted within the proposed infiltration area at the elevation associated with the proposed bottom of the infiltration structure. One deep test pit was excavated at this infiltration test to identify limiting conditions such as mottling, depth of bedrock, and depth of groundwater. Testing was to be conducted within the footprint of the proposed infiltration structure.

- Infiltration Test 2-2-1 was conducted at approximately ± 4.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 332.2. One deep test pit was excavated at this location to a depth of 76 inches below existing grade. During excavation, groundwater was encountered at a depth of approximately 76 inches below existing grade.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, Howell Engineering recommends the following infiltration rate for the soils underlying Test 2-2-1: an infiltration rate of 0.20 inches per hour shall be used.

- A second infiltration test (2-2-2) was proposed on this property. During excavation, groundwater was encountered at a depth of approximately 26 inches below existing grade. AS a result of the groundwater encountered, no infiltration testing was conducted at this location.

On lot 1013 Shiloh Road (Stokes property), one hydraulic conductivity test was conducted within the proposed infiltration area at the elevation associated with the proposed bottom of the infiltration structure. One deep test pit was excavated at this infiltration test to identify limiting conditions such as mottling, depth of bedrock, and depth of groundwater. Testing was to be conducted within the footprint of the proposed infiltration structure.

- Infiltration Test 2-2-3 was conducted at approximately ± 7.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 336.0. One deep test pit was excavated at this location to a depth of 9.0 feet below existing grade. No limiting conditions were identified at the time of excavation.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, Howell Engineering recommends the following infiltration rate for the soils underlying Test 2-2-3: an infiltration rate of 0.77 inches per hour shall be used.

Please reference plan drawings for exact locations and visual representation of infiltration tests and test pits. Results of the hydraulic conductivity testing and soil horizon descriptions can be found in the enclosed attachments.

Hydraulic Conductivity Calculation

Coefficient of Permeability: $K = [A/(F*D*t)] \times \ln (h1 / h2)$

Where:
K = permeability (inches per hour)
A = cross sectional area of cased hole
F = shape factor (2.75 constant of flat bottom)
D = cased hole diameter
t = time for head change from h1 to h2
h1 = initial height of water column in casing
h2 = final height of water column in casing

*Reference *Soil Hydraulic Conductivity Analysis Form* for infiltration testing data and *Soil Morphology Form* for soil profile data.

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Stormwater Infiltration Testing & Hydraulic Conductivity Calculations

JOB NO.: 3868 **DATE:** 2/2/2023
LOCATION: 1011-1013 Shiloh Road **BY:** DWD
MUNICIPALITY: Westtown Township, Chester County, Pa.
DESCRIPTION: Stormwater Infiltration Testing

Field Test Results

WEATHER CONDITIONS: SUNNY **TEMPERATURE:** 43 °F
PRECIPITATION IN LAST 24 HOURS: None

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 2-2-1	48									
Time(min.)		*30*	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		*2.50*	2.00	2.00	2.00	2.00	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		*18*	18	18	18	18	n/a	n/a	n/a	n/a

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 2-2-3	84									
Time(min.)		*30*	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		*8.75*	6.50	6.50	6.50	6.50	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		*18*	18	18	18	18	n/a	n/a	n/a	n/a

Detemination of Hydraulic Conductivity (Kv)

$$Kv = [\ A/F*D*t\ ] * \ln(h1/h2)$$

		Test 2-2-1 Results		Test 2-2-3 Results	
Kv =	***Vertical Permeability***	**0.201833**	**(in/hour)**	**0.767733**	**(in/hour)**
A =	***Cross-sectional area of cased hole***	7.068583	(Sq.in.)	7.068583	(Sq.in.)
F =	***shape factor (2.75 constant for flat bottom)***	2.75	(Units)	2.75	(Units)
D =	***cased hole diameter***	3	(Inches)	3	(Inches)
t =	***time for head to change from h1 to h2***	0.5	(hrs.)	0.5	(hrs.)
h1 =	***initial height of water column in casing***	18	(Inches)	18	(Inches)
h2 =	***final height of water column in casing***	16.00	(Inches)	11.50	(Inches)

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Stormwater Infiltration Testing & Hydraulic Conductivity Calculations

JOB NO.: 3868 **DATE:** 2/1/2023
LOCATION: 1007 Shiloh Road **BY:** DWD
MUNICIPALITY: Westtown Township, Chester County, Pa.
DESCRIPTION: Stormwater Infiltration Testing

Field Test Results

WEATHER CONDITIONS: SUNNY **TEMPERATURE:** 41 °F
PRECIPITATION IN LAST 24 HOURS: None

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 2-1-1	72									
Time(min.)		*30*	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		*1.50*	1.50	1.50	1.50	1.50	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		*18*	18	18	18	18	18	18	n/a	n/a

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test										
Time(min.)		*30*	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)			n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		*18*	18	18	18	18	n/a	n/a	n/a	n/a

Detemination of Hydraulic Conductivity (Kv)

$$Kv = [\ A/F*D*t\ ] * \ln(h1/h2)$$

		Test 2-1-1 Results		Test Results	
Kv =	***Vertical Permeability***	**0.1491**	**(in/hour)**		**(in/hour)**
A =	***Cross-sectional area of cased hole***	7.06858	(Sq.in.)	7.0686	(Sq.in.)
F =	***shape factor (2.75 constant for flat bottom)***	2.75	(Units)	2.75	(Units)
D =	***cased hole diameter***	3	(Inches)	3	(Inches)
t =	***time for head to change from h1 to h2***	0.5	(hrs.)	0.5	(hrs.)
h1 =	***initial height of water column in casing***	18	(Inches)	18	(Inches)
h2 =	***final height of water column in casing***	16.50	(Inches)		(Inches)

Test Permeability **0.15** (in./hr)

Soil Morphology Form

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PIT NUMBER: TP 2-1-1 JOB NUMBER: 3868 INVESTIGATOR: DWD
DATE: 2/1/2023 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: N/A SITE LOCATION: 1007 SHILOH RD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	6	G	S	10 YR 4/2	SILT LOAM	0				GRAN	FRI		
	6	54	A	W	10 YR 6/4	SILTY CLAY	0				MA	VFIRM		
	54	88	A	W	10 YR 4/3	STONY SILT	<20				GRAN	FIRM		
	88	108			10 YR 5/4	SILT LOAM	0				GRAN	LO		

COMMENTS: This Deep Test Pit was conducted at Test 2-1-1. Redoximorphic (redox) features were encountered from approximately 6-54 inches below existing grade.

SOIL TYPE:	Soil Drainage Class:	Soil Scientist Signature:
LIMITING CONDITION:	Excessively Drained Somewhat Poorly Drained	
Type: Water Rock Mottling	Well Drained **Poorly Drained**	
Depth: +108"	Moderately Well Drained Very Poorly Drained	

WEATHER: 41° Mostly Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 108"
COVER: Lawn LANDSCAPE POSITION: N

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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Soil Morphology Form

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PIT NUMBER: TP 2-2-1 JOB NUMBER: 3868 INVESTIGATOR: DWD
DATE: 2/2/2023 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: N/A SITE LOCATION: 1011 SHILOH RD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	6	G	S	10 YR 4/2	SILT LOAM	0				GRAN	FRI		
	6	20	A	W	10 YR 4/4	SILTY CLAY	0				MA	FRI		
	20	48	A	W	2.5 Y 6/4	SILTY CLAY	0				MA	FIRM		
	48	76			10 YR 5/1	SANDY SILT	0				GRAN	FRI		

COMMENTS: This Deep Test Pit was conducted at Test 2-2-1. Groundwater was encountered at approximately 76 inches below existing grade.

SOIL TYPE:	Soil Drainage Class:	Soil Scientist Signature:
LIMITING CONDITION: Groundwater	Excessively Drained **Somewhat Poorly Drained**	
Type: **Water** Rock Mottling	Well Drained Poorly Drained	
Depth: ~76"	Moderately Well Drained Very Poorly Drained	

WEATHER: 43° Mostly Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 76"
COVER: Lawn LANDSCAPE POSITION: E

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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Soil Morphology Form

HOWELL ENGINEERING
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PIT NUMBER: TP 2-2-3 JOB NUMBER: 3868 INVESTIGATOR: DWD
DATE: 2/2/2023 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: N/A SITE LOCATION: 1013 SHILOH RD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	7	G	S	10 YR 4/3	SILT LOAM	0				GRAN	FRI		
	7	35	A	W	10 YR 5/4	SILTY CLAY	0				MA	FRI		
	35	108			VAR	SANDY SILT	0				GRAN	FRI		

COMMENTS: This Deep Test Pit was conducted at Test 2-2-3. No limiting conditions were identified at the time of excavation.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION:	Excessively Drained	Somewhat Poorly Drained	
Type: Water Rock Mottling	Well Drained	Poorly Drained	
Depth: +108"	**Moderately Well Drained**	Very Poorly Drained	

WEATHER: 43° Mostly Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 108"
COVER: Lawn LANDSCAPE POSITION: W

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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F: (610) 918-9003

STORMWATER INFILTRATION REPORT

FOR

1007 & 1011 SHILOH ROAD
WESTTOWN TOWNSHIP
CHESTER COUNTY

PREPARED FOR:

Keystone Custom Homes
227 Granite Run Drive, Suite 100
Lancaster, PA 17601

PREPARED BY:

Howell Engineering
1250 Wrights Lane
West Chester, PA 19380

March 2023

HOWELL ENGINEERING
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Stormwater Infiltration Test Report
1007 & 1011 Shiloh Road
Westtown Township
Chester County

On Wednesday-Thursday, March 8-9, 2023, Howell Engineering preformed hydraulic conductivity tests for the proposed stormwater management areas for the properties located at 1007 and 1011 Shiloh Road in Westtown Township, Chester County. The purpose of the hydraulic conductivity testing was to determine site suitability for the proposed stormwater infiltration area associated with proposed improvements at the site (see development plan).

Testing was conducted in general accordance with the Pennsylvania Department of Environmental Protection (PADEP)'s Pennsylvania Stormwater Best Management Practices Manual specifications, in a cased, sealed, borehole utilizing the falling head method designed to measure the vertical hydraulic conductivity of the soil. An approximate five-inch diameter borehole was hand dug to the depth of the proposed bottom elevation of the infiltration structure and a 3-inch diameter PVC casing was installed. A mixture of bentonite and soil was placed around the annulus of the casing and packed to seal the casing in place. The casing was presoaked immediately prior to the start of the test to simulate field saturated conditions. A measured amount of water was poured into the sealed casing to begin the 30-minute presoak. After the final 30-minute presoaking period, the water in the casing was adjusted to a known depth and consecutively re-adjusted after each reading and the drop of the water column is measured. The test continued until the readings became stabilized or for a maximum of eight readings. A stabilized rate of drop means a difference of ¼ inch or less of drop between the highest and lowest readings of four consecutive readings.

On lot 1007 Shiloh Road (Obrien property), two hydraulic conductivity tests were conducted within the proposed infiltration areas at the elevations associated with the proposed bottom of the infiltration structures. One deep test pit was excavated at each infiltration test to identify limiting conditions such as mottling, depth of bedrock, and depth of groundwater. Testing was to be conducted within the footprint of the proposed infiltration structure.

- Infiltration Test 3-9-1 was conducted at approximately ± 3.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 377.0. One deep test pit was excavated at this location to a depth of 5.0 feet below existing grade. During excavation, rock was encountered at a depth of approximately 61 inches below existing grade.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, Howell Engineering recommends the following infiltration rate for the soils underlying Test 3-9-1: an infiltration rate of 0.175 inches per hour shall be used.

- Infiltration Test 3-9-2 was conducted at approximately ± 8.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 342.0. One deep test pit was excavated at this location to a depth of 10.0 feet below existing grade. No limiting conditions were identified at the time of excavation.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, Howell Engineering recommends the following infiltration rate for the soils underlying Test 3-9-2: an infiltration rate of 2.376 inches per hour shall be used.

On lot 1011 Shiloh Road (Galilea property), three hydraulic conductivity tests were conducted within the proposed infiltration areas at the elevations associated with the proposed bottom of the infiltration structures. One deep test pit was excavated at each infiltration test to identify limiting conditions such as mottling, depth of bedrock, and depth of groundwater. Testing was to be conducted within the footprint of the proposed infiltration structures.

- Infiltration Test 3-8-1 was conducted at approximately ± 8.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 364.0. One deep test pit was excavated at this location to a depth of 10.0 feet below existing grade. No limiting conditions were identified at the time of excavation.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, Howell Engineering recommends the following infiltration rate for the soils underlying Test 3-8-1: an infiltration rate of 4.855 inches per hour shall be used.

- Infiltration Test 3-8-2 was conducted at approximately ± 4.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 362.0. One deep test pit was excavated at this location to a depth of 6.0 feet below existing grade. No limiting conditions were identified at the time of excavation.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, Howell Engineering recommends the following infiltration rate for the soils underlying Test 3-8-2: an infiltration rate of 0.284 inches per hour shall be used.

- Infiltration Test 3-8-3 was conducted at approximately ± 4.0 feet below existing grade, which corresponds to an approximate infiltration elevation of 357.0. One deep test pit was excavated at this location to a depth of 6.0 feet below existing grade. During excavation, redoximorphic features were identified from approximately 41-72 inches below existing grade.

Based on the hydraulic conductivity testing located within the footprint of the infiltration structure, Howell Engineering recommends the following infiltration rate for the soils underlying Test 3-8-3: an infiltration rate of 0.123 inches per hour shall be used.

Please reference plan drawings for exact locations and visual representation of infiltration tests and test pits. Results of the hydraulic conductivity testing and soil horizon descriptions can be found in the enclosed attachments.

Hydraulic Conductivity Calculation

Coefficient of Permeability: $K = [A/(F*D*t)] \times \ln (h1 / h2)$

Where:
K = permeability (inches per hour)
A = cross sectional area of cased hole
F = shape factor (2.75 constant of flat bottom)
D = cased hole diameter
t = time for head change from h1 to h2
h1 = initial height of water column in casing
h2 = final height of water column in casing

*Reference *Soil Hydraulic Conductivity Analysis Form* for infiltration testing data and *Soil Morphology Form* for soil profile data.

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Stormwater Infiltration Testing & Hydraulic Conductivity Calculations

JOB NO.: 3868 **DATE:** 3/9/2023
LOCATION: 1007 Shiloh Road **BY:** DWD
MUNICIPALITY: Westtown Township, Chester County, Pa.
DESCRIPTION: Stormwater Infiltration Testing

Field Test Results

WEATHER CONDITIONS: SUNNY **TEMPERATURE:** 48 °F
PRECIPITATION IN LAST 24 HOURS: None

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-9-1	36									
Time(min.)		*30*	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		*2.50*	2.00	1.75	1.75	1.75	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		*18*	18	18	18	18	n/a	n/a	n/a	n/a

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-9-2	96									
Time(min.)		*30*	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		*13.50*	13.50	13.50	13.50	13.50	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		*18*	18	18	18	18	n/a	n/a	n/a	n/a

Detemination of Hydraulic Conductivity (Kv)

$$Kv = [\ A/F*D*t\ ] * \ln(h1/h2)$$

		Test 3-9-1 Results		Test 3-9-2 Results	
Kv =	***Vertical Permeability***	**0.17526**	**(in/hour)**	**2.375548**	**(in/hour)**
A =	***Cross-sectional area of cased hole***	7.06858	(Sq.in.)	7.068583	(Sq.in.)
F =	***shape factor (2.75 constant for flat bottom)***	2.75	(Units)	2.75	(Units)
D =	***cased hole diameter***	3	(Inches)	3	(Inches)
t =	***time for head to change from h1 to h2***	0.5	(hrs.)	0.5	(hrs.)
h1 =	***initial height of water column in casing***	18	(Inches)	18	(Inches)
h2 =	***final height of water column in casing***	16.25	(Inches)	4.50	(Inches)

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Stormwater Infiltration Testing & Hydraulic Conductivity Calculations

JOB NO.: 3868 **DATE:** 3/8/2023
LOCATION: 1011 Shiloh Road **BY:** DWD
MUNICIPALITY: Westtown Township, Chester County, Pa.
DESCRIPTION: Stormwater Infiltration Testing

Field Test Results

WEATHER CONDITIONS: Mostly Sunny **TEMPERATURE:** 48 °F
PRECIPITATION IN LAST 24 HOURS: None

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-8-1	96									
Time(min.)		30	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**
Drop(inches)		18.00	11.50	11.00	11.00	11.00	11.00	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	18	n/a	n/a	n/a

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-8-2	48									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		3.50	3.00	2.75	2.75	2.75	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Hole #	Depth (Inches)	Readings								
		Pre-Soak	1st	2nd	3rd	4th	5th	6th	7th	8th
Test 3-8-3	48									
Time(min.)		30	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**
Drop(inches)		1.50	1.50	1.25	1.25	1.25	n/a	n/a	n/a	n/a
Initial Water Level Depth (inches)		18	18	18	18	18	n/a	n/a	n/a	n/a

Determination of Hydraulic Conductivity (Kv)

$$Kv = [\ A/(F*D*t)\ ] * \ln(h1/h2)$$

		Test 3-8-1 Results		Test 3-8-2 Results		Test 3-8-3 Results	
Kv =	***Vertical Permeability***	**4.85528**	**(in/hour)**	**0.2841**	**(in/hour)**	**0.12333**	**(in/hour)**
A =	***Cross-sectional area of cased hole***	7.06858	(Sq.in.)	7.06858	(Sq.in.)	7.06858	(Sq.in.)
F =	***shape factor (2.75 constant for flat bottom)***	2.75	(Units)	2.75	(Units)	2.75	(Units)
D =	***cased hole diameter***	3	(Inches)	3	(Inches)	3	(Inches)
t =	***time for head to change from h1 to h2***	0.16667	(hrs.)	0.5	(hrs.)	0.5	(hrs.)
h1 =	***initial height of water column in casing***	18	(Inches)	18	(Inches)	18	(Inches)
h2 =	***final height of water column in casing***	7.00	(Inches)	15.25	(Inches)	16.75	(Inches)

Soil Morphology Form

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PIT NUMBER: TP 3-9-1 JOB NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/9/2023 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: N/A SITE LOCATION: 1007 SHILOH RD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	10	A	W	10 YR 4/2	SILT LOAM	0				GRAN	FRI		
	10	37	A	W	7.5 YR 4/4	SILTY CLAY	0				MA	VFIRM		
	37	61			7.5 YR 4/6	STONY SILT	<20				GRAN	FRI		

COMMENTS: This Deep Test Pit was conducted at Test 3-9-1. During excavation, rock was encountered at a depth of approximately 61 inches below existing grade.

SOIL TYPE:	Soil Drainage Class:	Soil Scientist Signature:
LIMITING CONDITION: Rock	Excessively Drained **Somewhat Poorly Drained**	
Type: Water **Rock** Mottling	Well Drained Poorly Drained	
Depth: approx. 61"	Moderately Well Drained Very Poorly Drained	

WEATHER: 48° Mostly Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 61"
COVER: Lawn LANDSCAPE POSITION: N

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

1250 Wrights Lane
West Chester, PA 19380

P: (610) 918-9002
F: (610) 918-9003

Soil Morphology Form

HOWELL ENGINEERING
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PIT NUMBER: TP 3-9-2 JOB NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/9/2023 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: N/A SITE LOCATION: 1007 SHILOH RD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	6	A	W	10 YR 4/2	SILT LOAM	0				SBK	FRI		
	6	24	G	S	10 YR 4/6	SILT LOAM	0				MA	FRI		
	24	57	G	S	10 YR 4/3	SILT LOAM	0				GRAN	FRI		
	57	120			VAR	SANDY SILT	0				GRAN	LO	some large rock	

COMMENTS: This Deep Test Pit was conducted at Test 3-9-2. No limiting conditions were identified at the time of excavation.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION:	Excessively Drained	Somewhat Poorly Drained	
Type: Water Rock Mottling	**Well Drained**	Poorly Drained	
Depth: +120"	Moderately Well Drained	Very Poorly Drained	

WEATHER: 48° Mostly Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 120"
COVER: Lawn LANDSCAPE POSITION: E

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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HOWELL ENGINEERING
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PIT NUMBER: TP 3-8-1 JOB NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/8/2023 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: N/A SITE LOCATION: 1011 SHILOH RD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	4	A	W	10 YR 4/2	SILT LOAM	0				SBK	FIRM		
	4	33	G	S	7.5 YR 4/4	SILTY CLAY	0				MA	FRI		
	33	59	A	C	VAR	SILTY CLAY	0				MA	FRI		
	59	120			VAR	SANDY SILT	0				GRAN	LO		

COMMENTS: This Deep Test Pit was conducted at Test 3-8-1. No limiting conditions were identified at the time of excavation.

SOIL TYPE:	Soil Drainage Class:	Soil Scientist Signature:
LIMITING CONDITION:	Excessively Drained Somewhat Poorly Drained	
Type: Water Rock Mottling	**Well Drained** Poorly Drained	
Depth: +120"	Moderately Well Drained Very Poorly Drained	

WEATHER: 48° Mostly Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 120"
COVER: Pasture LANDSCAPE POSITION: N

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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Soil Morphology Form

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PIT NUMBER: TP 3-8-2 JOB NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/8/2023 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: N/A SITE LOCATION: 1011 SHILOH RD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	7	A	W	10 YR 5/2	SILT LOAM	0				SBK	FIRM		
	7	45	G	S	10 YR 5/8	SILTY CLAY	0				MA	VFIRM		
	45	72			10 YR 3/3	SILT LOAM	0				GRAN	FRI		

COMMENTS: This Deep Test Pit was conducted at Test 3-8-2. No limiting conditions were identified at the time of excavation.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION:	Excessively Drained	**Somewhat Poorly Drained**	
Type: Water Rock Mottling	Well Drained	Poorly Drained	
Depth: +72"	Moderately Well Drained	Very Poorly Drained	

WEATHER: 48° Mostly Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 72"
COVER: Pasture LANDSCAPE POSITION: N

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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F: (610) 918-9003

Soil Morphology Form

HOWELL ENGINEERING
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PIT NUMBER: TP 3-8-3 JOB NUMBER: 3868 INVESTIGATOR: DWD
DATE: 3/8/2023 STATE: PA COUNTY: CHESTER
MUNICIPALITY: WESTTOWN TOWNSHIP CLIENT: KEYSTONE CUSTOM HOMES
SUBDIVISION: N/A SITE LOCATION: 1011 SHILOH RD
MORPHOLOGIC DETERMINATION: SEWAGE **STORMWATER** SHWT SOILS

Horizon	Depth		Boundary		Color	Texture	%CFs	REDOX			Structure	Consistence	NOTES	
	Upper	Lower	Distrnct	Topo				A	S	C				
	0	13	A	W	10 YR 4/2	SILT LOAM	0				MA	FRI		
	13	41	G	S	10 YR 5/6	SILTY CLAY	0				MA	FIRM		
	41	72			10 YR 6/4	SILTY CLAY	0	f	c	d	MA	FIRM		

COMMENTS: This Deep Test Pit was conducted at Test 3-8-3. During excavation, redoximorphic features were identified at approximatley 41-72 inches below exiting grade.

SOIL TYPE:	Soil Drainage Class:		Soil Scientist Signature:
LIMITING CONDITION: Redox	Excessively Drained	Somewhat Poorly Drained	
Type: Water Rock **Mottling**	Well Drained	**Poorly Drained**	
Depth: approx 41-72"	Moderately Well Drained	Very Poorly Drained	

WEATHER: 48° Mostly Sunny METHOD: Excavator
SLOPE: EXCAVATION DEPTH: 72"
COVER: Pasture LANDSCAPE POSITION: SE

REDOX – Redoxymorphic features (Drainage Mottling) A/S/C – Abundance/Size/Contrast
Roots/Pores – f – few, c – common, m – many / f – fine, m – medium, c – coarse

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LEGEND

- EX. PROPERTY LINE
- PROP. PROPERTY LINE
- EX. RIGHT-OF-WAY
- PROP. RIGHT-OF-WAY
- EX. MONUMENT
- PROP. MONUMENT
- EX. IRON PIPE
- PROP. IRON PIPE
- EX. EASEMENT
- PROP. EASEMENT
- EX. WETLANDS
- 242 EXISTING CONTOUR
- 242 PROPOSED CONTOUR
- x 123.00 EXISTING SPOT ELEV.
- x 123.00 NEW SPOT ELEV.
- GeB2 SOILS TYPE
- SOILS LINE
- EX. CONC. CURB
- PROP. CONC. CURB
- EX. EDGE OF PAVING
- PROP. EDGE OF PAVING
- EX. LIGHT POLE
- PROP. LIGHT POLE
- EX. FENCE
- EX. MAIL BOX
- EX. SIGN
- PROP. SIGN
- EXIST. PARKING SPACES
- PROP. PARKING SPACES (TBR) TO BE REMOVED
- EX. TELE. LINE
- PROP. TELE. LINE
- EX. ELEC. LINE
- PROP. ELEC. LINE
- EX. UTILITY POLE
- PROP. UTILITY POLE
- EX. GUY ANCHOR
- EX. GAS LINE
- PROP. GAS LINE
- EX. GAS VALVE
- PROP. GAS VALVE
- EX. STORM SEWER LINE
- PROP. STORM SEWER LINE
- EX. STORM INLET
- PROP. STORM INLET
- PROP. STORM INLET ID
- PROP. SEEPAGE BED
- EX. SANITARY SEWER LINE
- PROP. SAN. SEWER LINE
- PROP. SAN. SEWER LATERAL
- PROP. SANITARY MH. ID
- EX. WATER LINE
- PROP. WATER LINE
- PROP. WATER LATERAL
- PROP. FIRE WATER LINE
- EX. WATER VALVE
- PROP. WATER VALVE
- EX. HYDRANT
- PROP. HYDRANT
- EX. MANHOLE
- PROP. MANHOLE
- ZONE AE FLOODPLAIN
- 15%-25% SLOPES
- 25%+ SLOPES
- WETLANDS

PRE-DEVELOPED DRAINAGE AREA PLAN

SCALE: 1"=100'

GRAPHIC SCALE
100 0 50 100 200
1 inch = 100 feet

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Civil Engineering
Land Planning
Environmental
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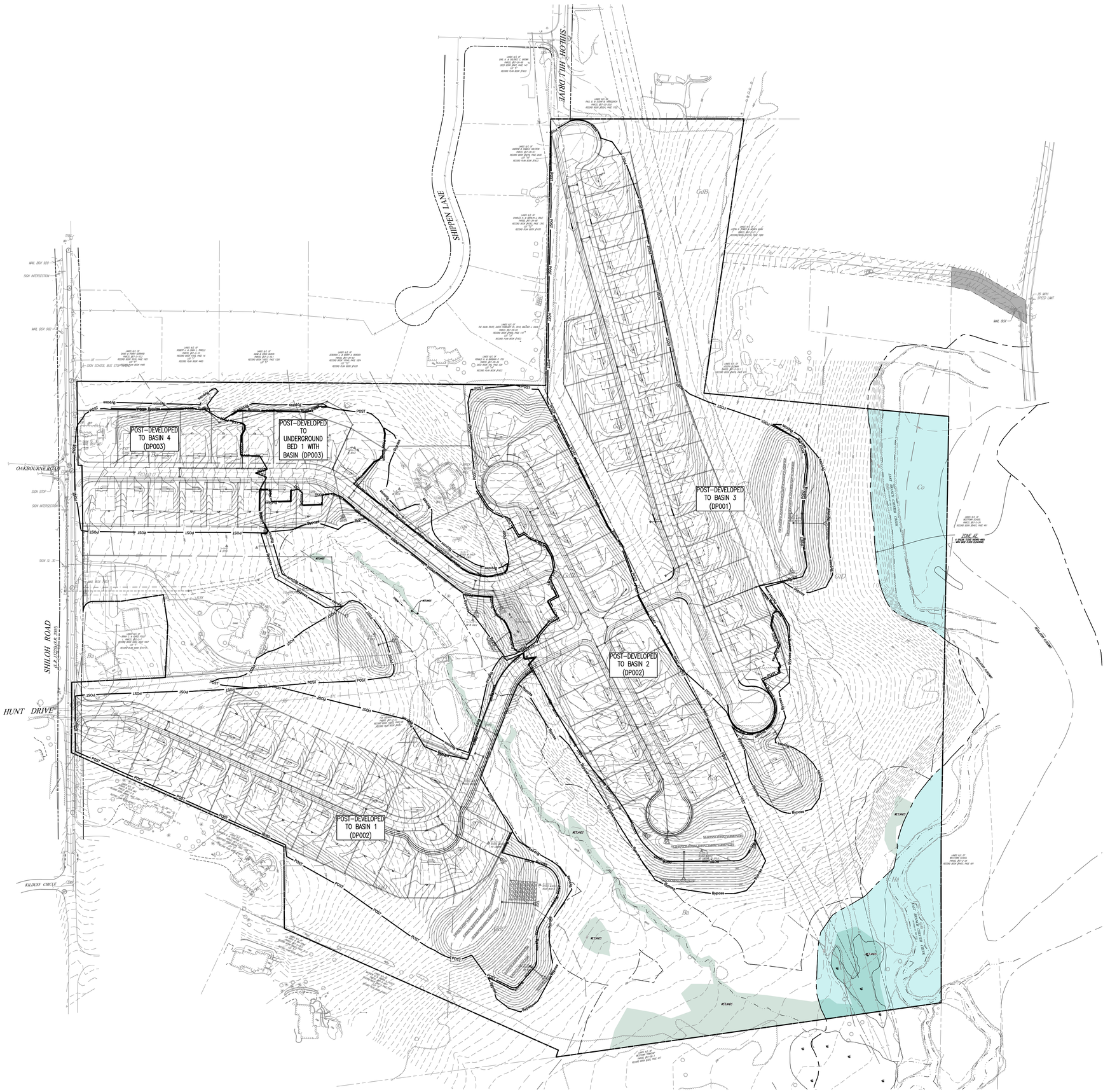
REV.	DATE	DESCRIPTION
1		
2		
3		
4		
5		
6		
7		
8		

PRE-DEVELOPED DRAINAGE AREA PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	09/01/21
SCALE:	1"=100'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	Drainage Area Plan.dwg
PLOTTED:	09/01/21
DRAWING NO.:	SWM-1
SHEET	1 of 2



LEGEND

- EX. PROPERTY LINE
- PROP. PROPERTY LINE
- EX. RIGHT-OF-WAY
- PROP. RIGHT-OF-WAY
- EX. MONUMENT
- PROP. MONUMENT
- EX. IRON PIPE
- PROP. IRON PIPE
- EX. EASEMENT
- PROP. EASEMENT
- EX. WETLANDS
- 242 EXISTING CONTOUR
- 242 PROPOSED CONTOUR
- X 123.00 EXISTING SPOT ELEV.
- x 123.00 NEW SPOT ELEV.
- GEB2 SOILS TYPE
- SOILS LINE
- EX. CONC. CURB
- PROP. CONC. CURB
- EX. EDGE OF PAVING
- PROP. EDGE OF PAVING
- EX. LIGHT POLE
- PROP. LIGHT POLE
- EX. FENCE
- EX. MAIL BOX
- EX. SIGN
- PROP. SIGN
- EXIST. PARKING SPACES (TBR) TO BE REMOVED
- PROP. PARKING SPACES
- EX. TELE. LINE
- PROP. TELE. LINE
- EX. ELEC. LINE
- PROP. ELEC. LINE
- EX. UTILITY POLE
- PROP. UTILITY POLE
- EX. GUY ANCHOR
- EX. GAS LINE
- PROP. GAS LINE
- EX. GAS VALVE
- PROP. GAS VALVE
- EX. STORM SEWER LINE
- PROP. STORM SEWER LINE
- EX. STORM INLET
- PROP. STORM INLET
- PROP. STORM INLET ID
- PROP. SEEPAGE BED
- EX. SANITARY SEWER LINE
- PROP. SAN. SEWER LINE
- PROP. SAN. SEWER LATERAL
- PROP. SANITARY MH. ID
- EX. WATER LINE
- PROP. WATER LINE
- PROP. WATER LATERAL
- PROP. FIRE WATER LINE
- EX. WATER VALVE
- PROP. WATER VALVE
- EX. HYDRANT
- PROP. HYDRANT
- EX. MANHOLE
- PROP. MANHOLE
- ZONE AE FLOODPLAIN
- 15%-25% SLOPES
- 25%+ SLOPES
- WETLANDS

POST-DEVELOPED DRAINAGE AREA PLAN

SCALE: 1"=100'

GRAPHIC SCALE
100 0 50 100 200
1 inch = 100 feet

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BOX	DESCRIPTION	DATE
8		
7		
6		
5		
4		
3		
2		
1		

POST-DEVELOPED DRAINAGE AREA PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES ESTATE
LOCATION: 1013 SHILOH ROAD
WESTTOWN TOWNSHIP, CHESTER COUNTY, PA

DATE:	09/01/21
SCALE:	1"=100'
DRAWN BY:	ADM
CHECKED BY:	DWG
PROJECT NO.:	3868
CAD FILE:	Drainage Area Plan.dwg
PLOTTED:	09/01/21
DRAWING NO.:	SWM-2
SHEET	2 of 2

Pennsylvania State Historic Preservation Office
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION

December 8, 2022

Robert Wise
Richard Grubb & Associates, Inc.
259 Prospect Plains Road
Building D
Cranbury PA 085120000

RE: ER Project # 2021PR05327.007, The Stokes Estate; Westtown Township, Chester County , Department of Environmental Protection, Westtown Township, Chester County

Dear Robert Wise:

Thank you for submitting information concerning the above referenced project. The Pennsylvania State Historic Preservation Office (PA SHPO) reviews projects in accordance with state and federal laws. Section 106 of the National Historic Preservation Act of 1966, and the implementing regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, is the primary federal legislation. The Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988) is the primary state legislation. These laws include consideration of the project's potential effects on both historic and archaeological resources.

Above Ground Resources
More Information Requested - Environmental Review - SHPO Sends Above Ground Comments

We have reviewed the letter of commitment for the above listed project and are in agreement with the proposed mitigation. We anticipate receipt of a letter outlining completion of the three mitigation stipulations in response to the Request for More Information on this project within six months of the start of construction. Inquiries about the $2500 donation to the barn grant fund should be provide to Priscilla deLeon of the Historic Barn and Farm Foundation who can be reached at priscilladeleonhbff@ptd.net.

More Information Requested - New Attachment

Please send documentation of completion of the mitigation stipulations to our office using this Request for More Information. Please submit the requested materials to the PA SHPO through PA-SHARE using the link under SHPO Requests More Information on the Response screen.

For questions concerning above ground resources, please contact Barbara Frederick at bafrederic@pa.gov.

Sincerely,

Emma Diehl
Environmental Review Division Manager

RICHARD GRUBB & ASSOCIATES
Historic Architecture • Archaeology • Historical Research
259 Prospect Plains Road | Building D | Cranbury, New Jersey 08512 | 609-655-0692 | rgaincorporated.com

November 30, 2022

Ms. Barbara Frederick
Pennsylvania State Historic Preservation Office
Commonwealth Keystone Building
400 North Street, Second Floor
Harrisburg, PA 17120

Submitted via PA-SHARE

Re: RE: ER Project # 2021PR05327.006, The Stokes Estate; Westtown Township, Chester County, Department of Environmental Protection; Letter of Commitment

Dear Ms. Frederick:

In response to the PA SHPO review letter from Emma Diehl dated November 9, 2022, this is a Letter of Commitment to mitigate effects of the proposed development of the Stokes Estate in Westtown Township, Chester County, Pennsylvania. The Applicant, Keystone Custom Homes is presently seeking conditional use approval, and projects obtaining final township approval in 2023. Once this and all other approvals are obtained, the applicant will fulfill the following stipulations within 90 days of recording a subdivision plan which proposes the removal of the existing dwelling and/or the existing barn, as stated in the November 9 letter. The applicant's mitigation plan follows each stipulation:

1. An experienced historic barn/building expert will be invited to examine the house and barn for items to be salvaged prior to demolition. A list of salvaged items will be provided to the SHPO as documentation of completion of the stipulation.

Mitigation Plan: The Applicant will select an experience salvage person to salvage materials from the house and the barn. The salvager will examine both buildings prior to demolition to determine items for salvage. Once salvage is complete, a list of salvaged items will be submitted to PA SHPO in fulfillment of this stipulation.

2. Prior to demolition, the Tredyffrin Township Historic Preservation Trust will be invited to examine remaining farm implements on the property for use in the Jones Log Barn Living History Center. A list of salvaged items will be provided to the SHPO as documentation of completion of the stipulation.

Mitigation Plan: Prior to demolition, a representative from the Tredyffrin Township Historic Preservation Trust will examine remaining farm implements for use in the Jones Log Barn Living History Center and remove them from the property. A list of salvaged items will be provided to PA SHPO in fulfillment of this stipulation.

3. Prior to the start of construction, $2,500 will be donated to the Historic Barn & Farm Foundation of Pennsylvania for the Barn Grant Fund. A letter of acknowledgement of receipt of donation will serve as documentation of completion.

Mitigation Plan: The applicant will make a $2,500 donation to the Historic Barn & Farm Foundation of Pennsylvania for the Barn Grant Fund (or applicable fund), and request a letter of acknowledgement of receipt of donation. Applicant will forward the acknowledgement letter to PA SHPO in fulfillment of this stipulation.

The applicant or its consultant plans on sending all three stipulation fulfillment elements as one submittal to PA SHPO through PA-SHARE using the link under SHPO Requests More Information on the Response screen. This submittal (or submittals if warranted) will be made within six months of completed fulfillment activities.

Thank you for your assistance in developing a mitigation strategy for this project. We hope this Letter of Commitment meets your approval and we look forward to your response. Should you have questions, please contact me at rwise@rgaincorporated.com, or 610-585-3598 (cell).

Sincerely,

Robert J. Wise, Jr.
Principal Senior Architectural Historian

Cc: Bill Briegel, Keystone Custom Homes

Pennsylvania State Historic Preservation Office
PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION

April 26, 2023

Robert Wise
Richard Grubb & Associates, Inc.
259 Prospect Plains Road
Building D
Cranbury PA 085120000

RE: ER Project # 2021PR05327.009, The Stokes Estate; Westtown Township, Chester County , Department of Environmental Protection, Westtown Township, Chester County

Dear Robert Wise:

Thank you for submitting information concerning the above referenced project. The Pennsylvania State Historic Preservation Office (PA SHPO) reviews projects in accordance with state and federal laws. Section 106 of the National Historic Preservation Act of 1966, and the implementing regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, is the primary federal legislation. The Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988) is the primary state legislation. These laws include consideration of the project's potential effects on both historic and archaeological resources.

Above Ground Resources
SHPO Sends Comments - Environmental Review - DOE - Not Eligible Above Ground Property

Based on the information received and available in our files, it is our opinion that the Briner House (Resource # 2023RE04196) is Not Eligible for listing in the National Register of Historic Places due to a lack of integrity and/or significance. This resource has not been evaluated for archaeological potential. Our opinion is conditional based on the information available to date. Please Note: Should new information be brought to our attention in any future reviews of the property, a re-evaluation of the significance, integrity, and/or overall National Register eligibility of this property may be necessary.

For questions concerning above ground resources, please contact Barbara Frederick at bafrederic@pa.gov.

Sincerely,

Emma Diehl
Environmental Review Division Manager

Form 2-G Pa.
Rev. 5-41

#3
RW 83
55¢ Stamps
8-8-64-P

RIGHT-OF-WAY

FOR AND IN CONSIDERATION of the sum of One Dollar ($1.00) and other valuable consideration in hand paid to Walter Rhoads White and Eleanor M. K. White his wife of Westtown Township Chester County and State of Pennsylvania

hereinafter called Grantor (whether one or more), the receipt of all of which is hereby acknowledged, Grantor does hereby grant and convey unto Sinclair Refining Company, a Maine corporation, hereinafter called Grantee, its successors and assigns, a right-of-way easement, together with and including the right to lay, maintain, inspect, operate, alter, repair, replace, remove and re-lay a pipe line for the transportation of crude petroleum, gas, the products or by-products of each thereof, water, and other substances of a like or different nature, and such drips, valves, fittings, meters and other equipment and appurtenances as may be necessary or convenient for such operations, and the further right to install, maintain, inspect, repair, operate and remove telegraph, telephone and electrical lines, or any of them, upon a single line of poles, or in underground conduits or by the use of underground cables, with such anchorage, equipment and appurtenances as may be necessary or convenient therefor, for use in connection with any pipe line or pipe lines laid hereunder, over, through, upon, under and across the following described land of which Grantor warrants he is the owner in fee simple, situated in Westtown Township, Chester County, in the Commonwealth of Pennsylvania, to wit:

Tract of land containing 89.78 Acres situate on the East side of a public road leading from Westtown to Shiloh and more particularly described in deed from Cathrine S. McKenna ~~and xxxxxxxxxxxxxxxxxxxxxxxxxxxx~~ to Walter Rhoads White and Eleanor M. K. White his wife dated November 4, and recorded in said County in Deed Book X-18 page 59.

and also, insofar as and to the extent that Grantor has the right to do so, over, through, upon, under and across the roads, streets, highways or other rights-of-way over, adjoining or appurtenant to the above described land, it being understood that whenever the term "said land" is hereinafter used it shall be deemed to include any such roads, streets, highways or other rights-of-way;

Together with at all times all rights of ingress, egress, and regress, to, over, upon, through and from said land necessary or convenient for the full and complete use by Grantee of the said right-of-way easement for the exercise of the rights and privileges granted or mentioned hereunder. Grantor, however, is not to be excluded from enjoying and occupying said land in any way that will not interfere with or prevent the use by Grantee of the said right-of-way easement and the exercise by Grantee of the rights and privileges granted or mentioned hereunder.

It is expressly agreed that in the event Grantor shall contemplate the construction of any buildings or other structures upon any portion of said land whereby the pipe line of Grantee will pass beneath or in close proximity to any such building or structure, Grantee shall have the right, before the commencement of construction thereof, to remove said pipe line and to relocate the same at a point on said land where buildings or other structures will not cause any interference with the maintenance, operation or repair of said pipe line.

Grantee hereby agrees to pay any damages that may arise with respect to Grantor's property occasioned by Grantee's operations hereunder. In the event Grantor and Grantee cannot agree upon the amount of said damages, then the amount shall be ascertained and determined by three (3) disinterested persons selected as follows: One by Grantor, one by Grantee, and the third by the two so selected, and the written award of a majority of said three persons so selected shall be final and conclusive on Grantor and Grantee.

Any pipe line or any underground conduit or cable for telephone, telegraph or electrical lines laid hereunder shall be buried below plow depth.

For an additional consideration of One Dollar ($1.00), the receipt of which is hereby acknowledged by Grantor, Grantor does hereby grant and convey unto Grantee, its successors and assigns, in the use of the right-of-way easement herein granted, a further right at any time, or from time to time, to lay, maintain, inspect, operate, alter, repair, replace, remove and re-lay an additional pipe line or additional pipe lines alongside of the said original pipe line for the transportation of any of the products or substances hereinbefore described, over, through, upon, under and across said land, which said additional line or lines shall be laid upon and subject to the same rights, privileges and conditions as herein provided in respect to said original line. Grantee agrees to pay to Grantor for each additional pipe line placed on said land by it the sum of one hundred and seventy-eight ~~xx~~ Dollars at or before the time Grantee commences to lay each such additional pipe line upon, over or through said land.

It is agreed that any payment hereafter required to be made hereunder may be made direct to Grantor, or in the event there is more than one Grantor, then to any one of them, or by depositing such payment to the credit of the Grantor, or any one of them in the event that there is more than one, in the ..... Bank, of ....., and payment so made shall be deemed and considered as payment to Grantor, or in the event that there is more than one Grantor, then to all of them.

(over)

This instrument and the right-of-way easement and each and all of the rights, privileges and interests granted to and conferred upon Grantee may be transferred, conveyed or assigned by Grantee.

This instrument and each and all of its terms, conditions and provisions shall extend to and be binding upon the heirs, executors, administrators, personal representatives, successors and assigns of Grantor and Grantee, respectively.

In the event the above mentioned telephone, telegraph and electrical lines are erected on poles above ground, they shall follow [redacted] roads on or abutting said property. The construction of the pipe line shall be hand ditched at the point nearest the house crossing the driveway, lawn and shrubbery and approximately from the South fence to the North line of the fence adjacent to the goat barn.

IN WITNESS WHEREOF, Grantor has executed this instrument as of the 9th day of June, 1941.

Walter Rhoads White (Seal)

Eleanor M. K. White (Seal)

(Seal)

(Seal)

Signed and delivered in the presence of:

Alfreda D. Anderson

J. F. McCabe

STATE OF Pennsylvania }
COUNTY OF Delaware } SS.

On this 9th day of June, A. D. 1941, before me, a Notary Public in and for Commonwealth of Pennsylvania, came the above named Walter Rhoads White and Eleanor M. K. White his wife

and acknowledged the foregoing instrument to be their act and deed, and desired the same to be recorded as such.

Witness my hand and Notarial seal, the day and year aforesaid.

Alfreda D. Anderson
Notary Public

My Commission Expires May 21, 1943

I hereby certify that the precise address of the within named Grantee is 630 - 5th Ave., New York, N. Y.
T. F. McCabe Agent

TENANT'S CONSENT

FOR AND IN CONSIDERATION OF THE SUM OF $....., to.....in hand paid, the receipt of which is hereby acknowledged,.....

as tenant(s) of the land or any part thereof described in the within or foregoing RIGHT-OF-WAY indenture, do(es) hereby consent to the execution by the Grantor of said RIGHT-OF-WAY indenture, and also to the exercise by Grantee, its successors or assigns, of all rights and privileges granted or mentioned in said RIGHT-OF-WAY indenture, with the understanding that all damages accruing from the exercise of said rights and privileges by Grantee, its successors or assigns, to any crops or other property of the said tenant(s) shall be paid to .....

DATED,....., 194....

Signed and delivered in the presence of:

.....

.....

7516

AUG 14 1941

Series..... Line No.....

FROM

TO

Line..... Length..... Rods

Recorded in the Office for Recording of Deeds in and for the County of Chester in Misc. Book #77 XXX. page 61 &

WITNESS my hand and seal of Office this 14th day of Aug. Anno Domini 1941.

Recorder

Deputy Recorder
Wm. J. O'Sullivan
Sinclair Ref Co.

2.50

Photo Exhibit 1

HOWELL ENGINEERING

Project: Stokes Estate
Location: Westtown Township, Chester County

Photo 1—View into site from Shiloh Road ROW

Photo 2—View into site from Shiloh Road ROW across from Oakborne Road

Photo Exhibit 2

HOWELL ENGINEERING

Project: Stokes Estate
Location: Westtown Township, Chester County

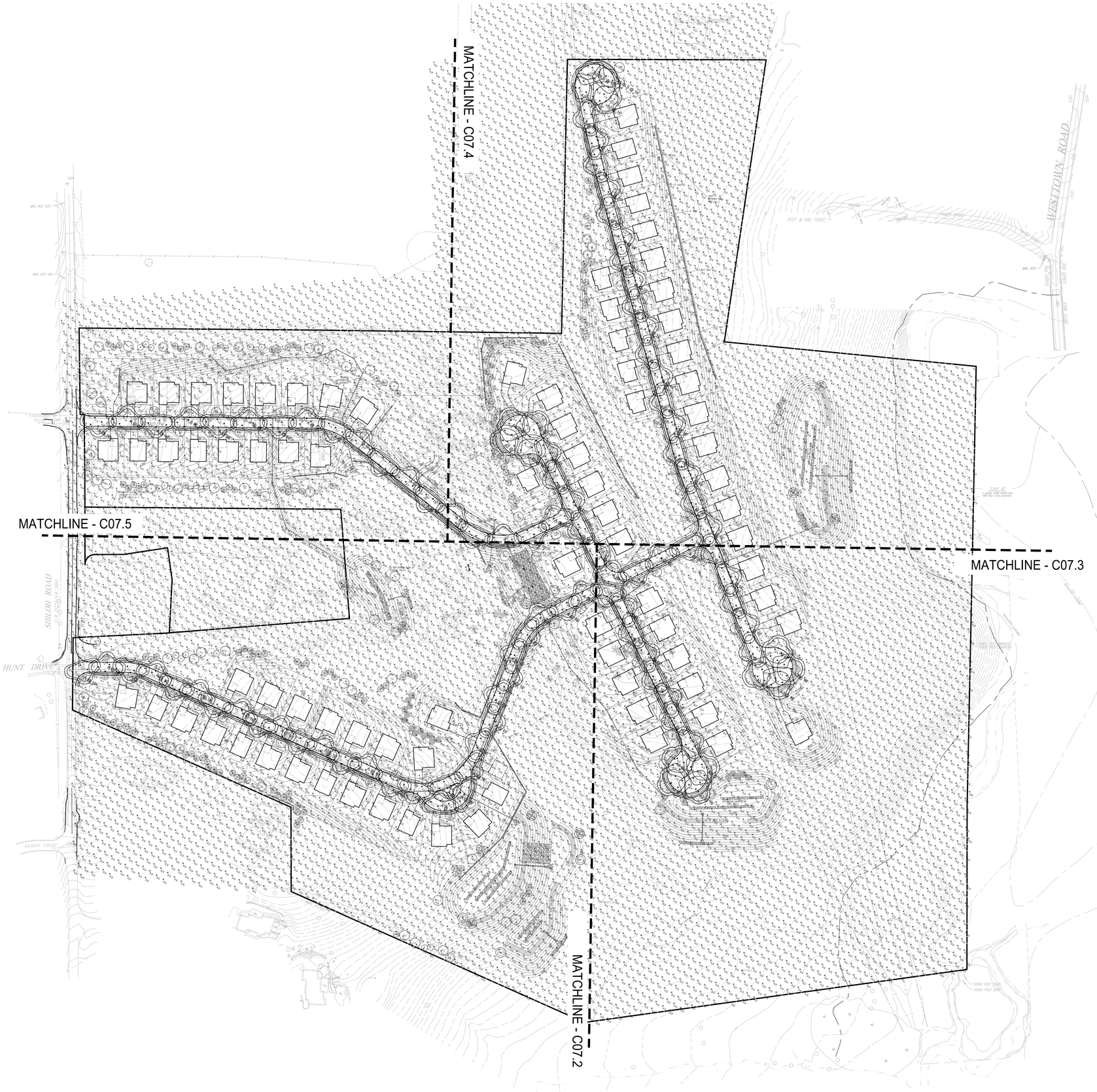
Photo 3—View into site from Shiloh Road ROW across from O'Brien Parcel

PHOTOMETRICS AND LIGHTING CALCULATIONS PREPARED BY:
Rochelle Spahn - MIES
Specification Applications – PHL/NY/NNJ484 420 2305 D

illuminations

1157 Phoenixville Pike, Suite 105 | West Chester, PA 19380
5 Pennsylvania Plaza, 24th Floor | New York, NY 10001
www.illuminationsinc.com

stuart
LANDSCAPE ARCHITECTS
PLANNERS | DESIGNERS

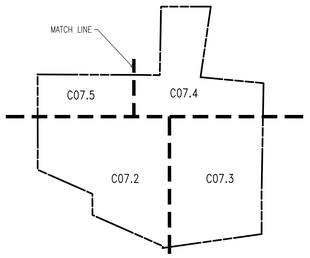


SITE PLAN NOTES:

1. ALL LINES AND GRADE WORK NOT PRESENTLY ESTABLISHED AT THE SITE SHALL BE LAID OUT BY A REGISTERED LAND SURVEYOR OR PROFESSIONAL CIVIL ENGINEER EMPLOYED BY THE CONTRACTOR IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
2. THIS PLAN TO BE USED FOR LANDSCAPING AND SITE IMPROVEMENT PURPOSED ONLY.
3. PLANS CREATED FROM DRAWINGS FROM DL HOWELL ENGINEERING DATED, 04/12/2023.
4. LOCATION OF ALL UNDERGROUND UTILITIES SHALL BE VERIFIED AND MARKED IN THE FIELD, PRIOR TO ANY DIGGING OPERATIONS.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING EXISTING TREES AND PLANT MATERIAL WITHIN THE AREA OF PROPOSED IMPROVEMENTS.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSING OF ALL DEBRIS OFF-SITE. CLEAN-UP OF ALL PAVED AREAS (ROADWAYS, SIDEWALKS, ETC.); AND RESTORATION OF ALL DISTURBED LAWN AREAS.
7. CONTRACTOR SHALL BE RESPONSIBLE TO REPAIR ANY DAMAGE TO UNDERGROUND UTILITIES DAMAGED.
8. CONTRACTOR SHALL PROVIDE SCREENED PLANTING SOIL WHERE PLANTING IS TO OCCUR. 36" DEPTH. 6" DEPTH AT LAWN AREAS.
9. FOLLOWING COMPLETION OF ALL PLANTING INSTALLATION WORK, THE CONTRACTOR SHALL BE REQUIRED TO RESTORE ALL DISTURBED LAWN AREAS.
10. NO TREE SHALL BE PLANTED CLOSER THAN 10 FEET FROM AN UNDERGROUND UTILITY.
11. ALL LINES ARE PARALLEL OR PERPENDICULAR UNLESS SHOWN OTHERWISE.
12. VERIFY LAYOUT OF ALL PROPOSED WORK TO EXISTING CONDITIONS. REPORT DISCREPANCIES BEFORE ANY CLEARING OR EXCAVATION IS DONE.
13. PROVIDE STAKED LAYOUT ON SITE FOR OWNER AND LANDSCAPE ARCHITECT'S REVIEW PRIOR TO COMMENCING WORK.
14. ALL DIMENSIONS SHOWN ARE TO FACE OF MATERIALS, UNLESS SHOWN OTHERWISE.
15. PLEASE NOTE, CLIENT DID NOT RETAIN STUART AND ASSOCIATES, LLC.. TO PROVIDE LONG TERM MAINTENANCE SPECIFICATIONS FOR THE LANDSCAPE MATERIAL.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING PA ONE CALL AND LOCATING ALL UNDERGROUND UTILITIES BEFORE ANY DIGGING OR PLANT REMOVAL OCCURS.
17. CONTRACTOR SHALL INSTALL SILT FENCE IN ANY AREAS WHERE SOIL MAY RUNOFF INTO PARKING AREAS OR INTO EXISTING INLETS.
18. FOLLOWING THE COMPLETION, THE EXISTING VEGETATION WILL BE INSPECTED FOR HEALTH AND QUALITY, AND IF NOT DEEMED IN GOOD CONDITION, REPLACED WITH THE EQUIVALENT COMPENSATORY PLANTINGS.
19. V.I.F. = VERIFY IN FIELD.

SPEC NOTES:
1. POST LIGHT TO BE INSTALLED ON MATCHING FINISH POLE.
2. FINISH/COLOR : BLACK
3. MOUNTING HEIGHT : 16'
4. SEE PLAN/SCHEDULE FOR DISTRIBUTION TYPE.
5. WATTAGE TO BE SELECTED BY CONTRACTOR.

CONTRACTOR NOTES:
1. GENERAL CONTRACTOR TO COORDINATE AND PROVIDE CONDUIT PER LIGHTING SHOWN.
2. CONTRACTOR TO PROVIDE LIGHTING SUBMITTAL FOR FINAL APPROVAL BY OWNER AND LANDSCAPE ARCHITECT.
3. REFER TO MANUFACTURER FOR INSTALLATION INSTRUCTIONS.



KEY MAP
N.T.S

OVERALL LIGHTING PLAN
SCALE: 1"=100'

100 0 50 100 200
GRAPHIC SCALE
1 inch = 100 feet

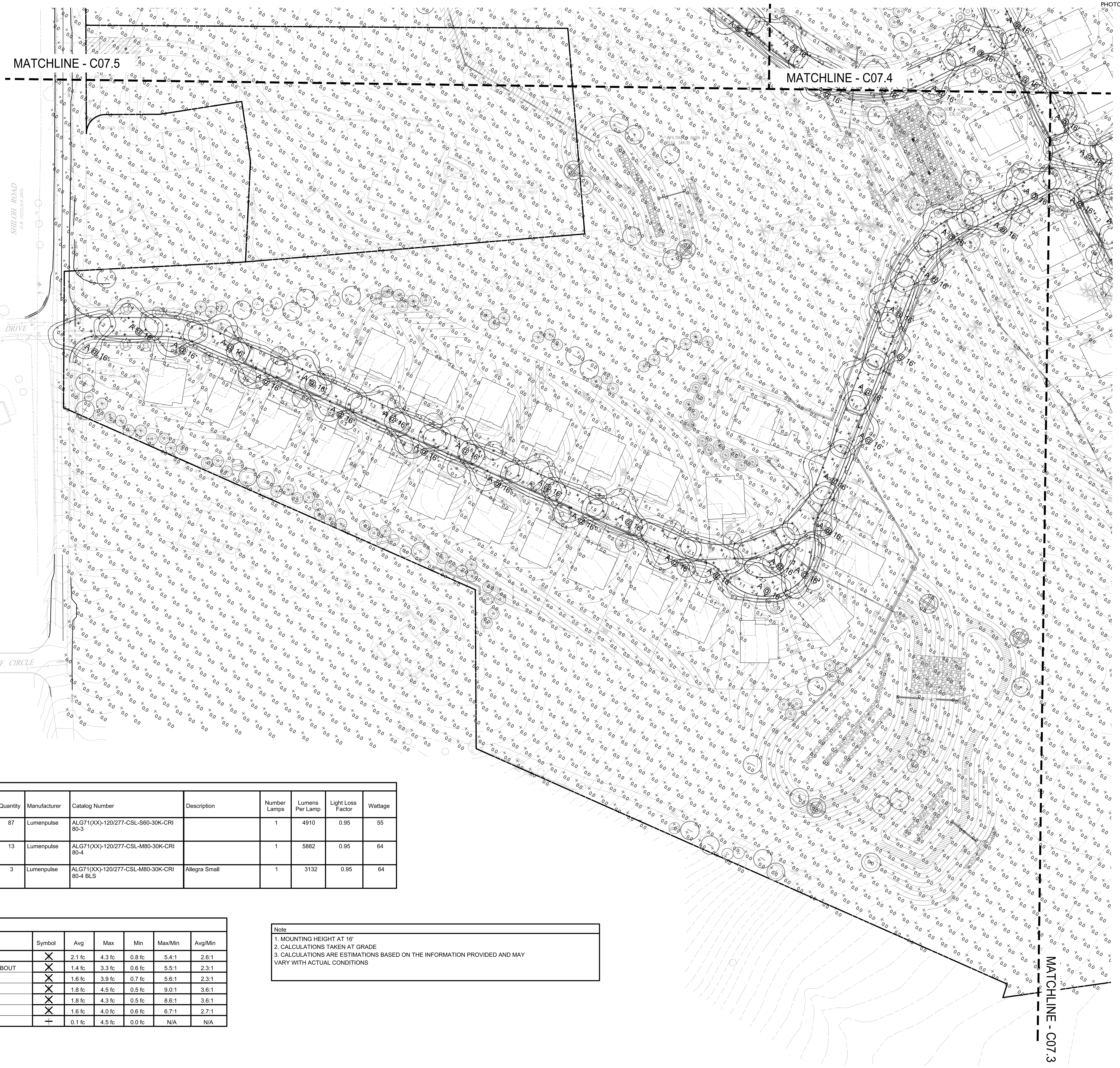
DLHowell
Civil Engineering
Land Planning
Environmental
www.DLHowell.com

1250 Wrights Lane
West Chester, PA 19380
Phone: (610) 918-9002
Fax: (610) 918-9003

NO.	DATE	DESCRIPTION
1	6-14-23	PER TOWNSHIP ENGINEER COMMENTS
2		
3		
4		
5		
6		
7		
8		

CONDITIONAL USE
OVERALL LIGHTING PLAN
CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD
WESTTOWN TWP., CHESTER COUNTY, PA

DATE:	04/17/23
SCALE:	1"=100'
DRAWN BY:	JPL
CHECKED BY:	PJS
PROJECT NO.:	3868
CAD FILE:	20230616_STOKES_TLP.dwg
PLOTTED:	06/14/23
DRAWING NO.:	C07.1
SHEET	29 OF 37



Schedule									
Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Number Lamps	Lumens Per Lamp	Light Loss Factor	Wattage
○	A	87	Lumenpulse	ALG71(XX)-120/277-CSL-S60-30K-CRI 80-3		1	4910	0.95	55
○	A2	13	Lumenpulse	ALG71(XX)-120/277-CSL-M80-30K-CRI 80-4		1	5882	0.95	64
○	A2-BLS	3	Lumenpulse	ALG71(XX)-120/277-CSL-M80-30K-CRI 80-4 BLS	Allegra Small	1	3132	0.95	64

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
ROAD A	X	2.1 fc	4.3 fc	0.8 fc	5.4:1	2.6:1
ROAD A - ROUNDABOUT	X	1.4 fc	3.3 fc	0.6 fc	5.5:1	2.3:1
ROAD B	X	1.6 fc	3.9 fc	0.7 fc	5.6:1	2.3:1
ROAD C	X	1.8 fc	4.5 fc	0.5 fc	9.0:1	3.6:1
ROAD D	X	1.8 fc	4.3 fc	0.5 fc	8.6:1	3.6:1
ROAD E	X	1.6 fc	4.0 fc	0.6 fc	6.7:1	2.7:1
AREA	+	0.1 fc	4.5 fc	0.0 fc	N/A	N/A

Note

1. MOUNTING HEIGHT AT 16'
2. CALCULATIONS TAKEN AT GRADE
3. CALCULATIONS ARE ESTIMATIONS BASED ON THE INFORMATION PROVIDED AND MAY VARY WITH ACTUAL CONDITIONS

PHOTOMETRICS AND LIGHTING CALCULATIONS PREPARED BY:
Rochelle Spahn - MIES
Specification Applications – PHL/NY/NNJ 484 420 2305 D

illuminations

1157 Phoenixville Pike, Suite 105 | West Chester, PA 19380
5 Pennsylvania Plaza, 24th Floor | New York, NY 10001
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LANDSCAPE ARCHITECTS
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1250 Wrights Lane
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Phone: (610) 918-9002
Fax: (610) 918-9003

SITE PLAN NOTES:

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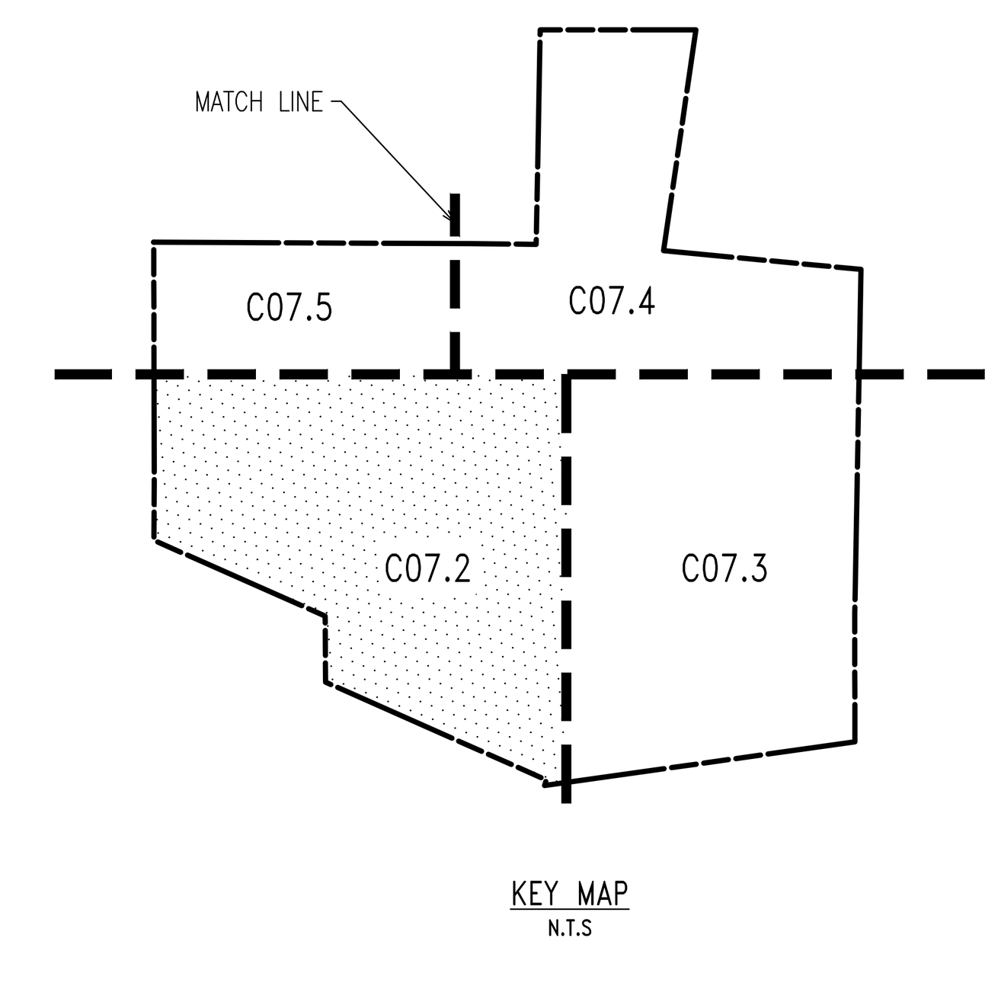

KEY MAP
N.T.S.

LIGHTING PLAN
SCALE: 1"=50'

50 0 25 50 100
GRAPHIC SCALE
1 inch = 50 feet

REV.	DATE	DESCRIPTION
1	6-14-23	PER TOWNSHIP ENGINEER COMMENTS
2		
3		
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5		
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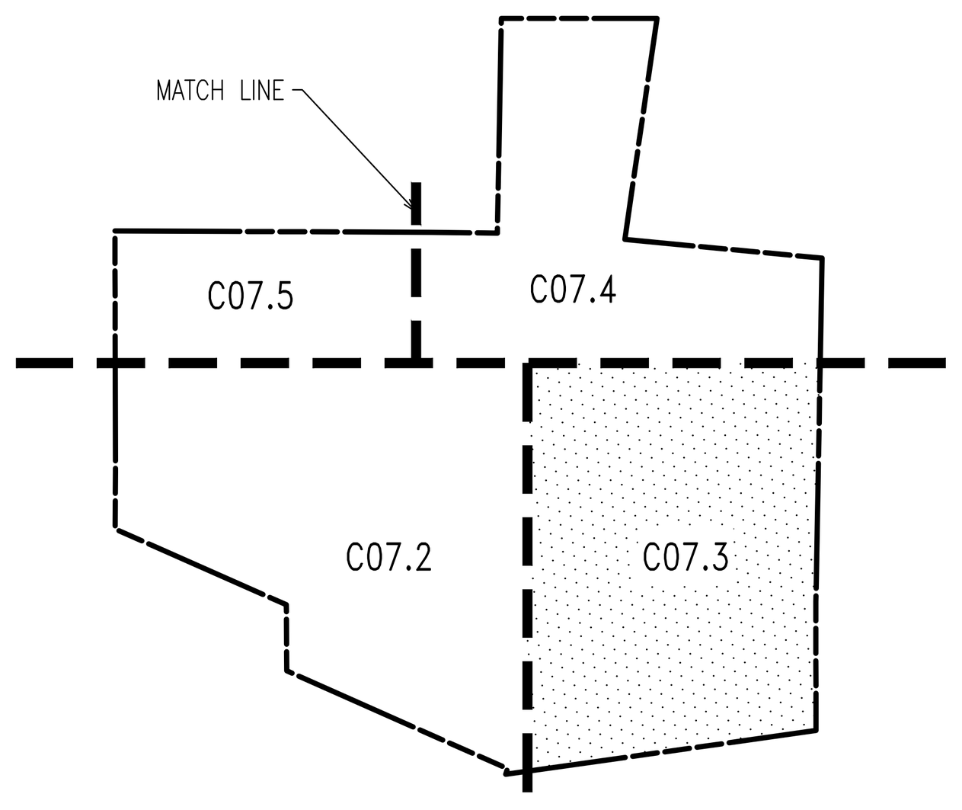
7		
8		

CONDITIONAL USE
LIGHTING PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD, WESTTOWN TWP., CHESTER COUNTY, PA

DATE:	04/17/23
SCALE:	1"=50'
DRAWN BY:	JPL
CHECKED BY:	PJS
PROJECT NO.:	3868
CAD FILE:	20230616_STOKES_TLP.dwg
PLOTTED:	06/14/23
DRAWING NO.:	C07.2
SHEET	30 OF 37



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N.T.S

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9. FOLLOWING COMPLETION OF ALL PLANTING INSTALLATION WORK, THE CONTRACTOR SHALL BE REQUIRED TO RESTORE ALL DISTURBED LAWN AREAS.
10. NO TREE SHALL BE PLANTED CLOSER THAN 10 FEET FROM AN UNDERGROUND UTILITY.
11. ALL LINES ARE PARALLEL OR PERPENDICULAR UNLESS SHOWN OTHERWISE.
12. VERIFY LAYOUT OF ALL PROPOSED WORK TO EXISTING CONDITIONS. REPORT DISCREPANCIES BEFORE ANY CLEARING OR EXCAVATION IS DONE.
13. PROVIDE STAKED LAYOUT ON SITE FOR OWNER AND LANDSCAPE ARCHITECT'S REVIEW PRIOR TO COMMENCING WORK.
14. ALL DIMENSIONS SHOWN ARE TO FACE OF MATERIALS, UNLESS SHOWN OTHERWISE.
15. PLEASE NOTE, CLIENT DID NOT RETAIN STUART AND ASSOCIATES, LLC.. TO PROVIDE LONG TERM MAINTENANCE SPECIFICATIONS FOR THE LANDSCAPE MATERIAL.
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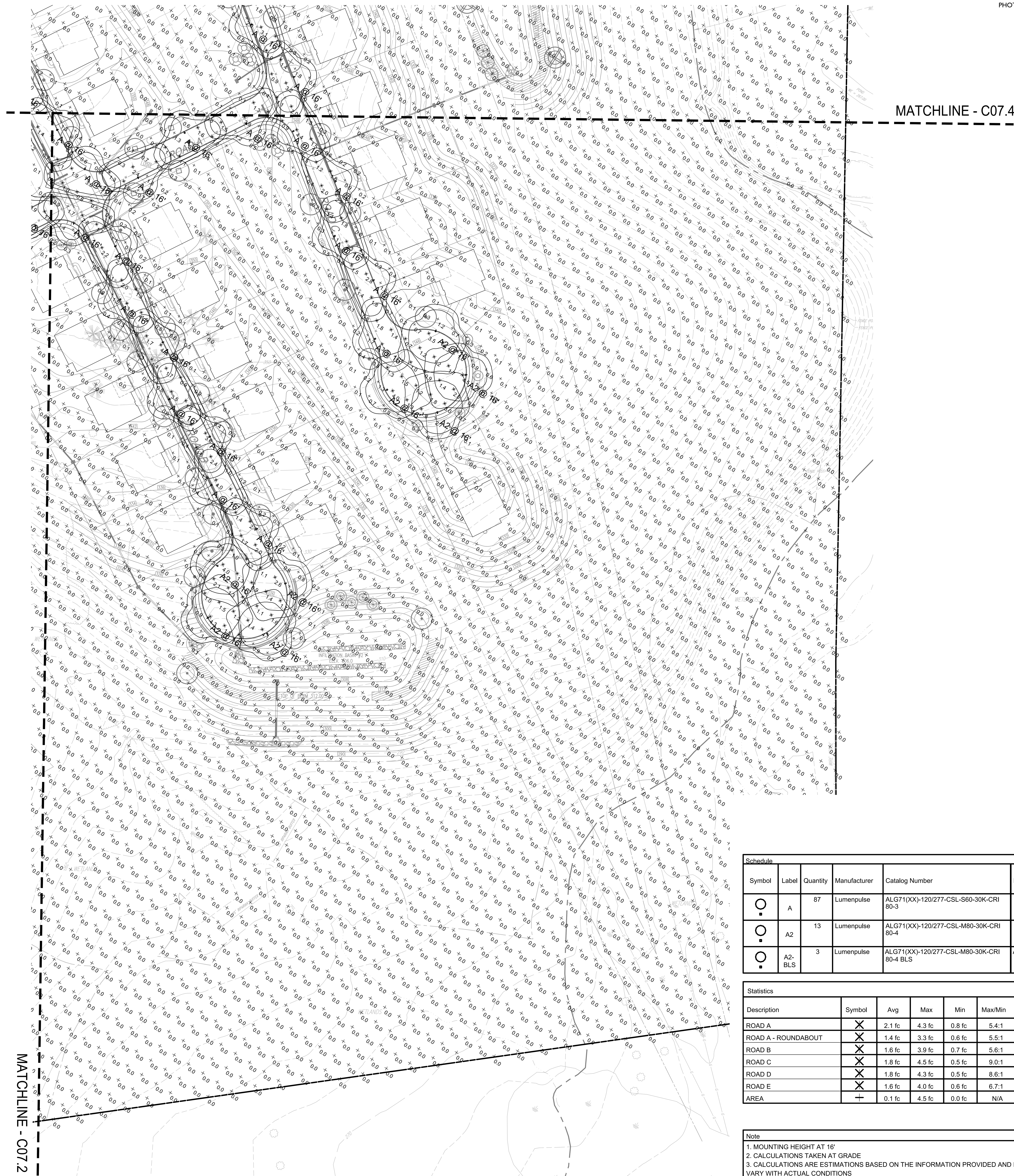
19. V.I.F. = VERIFY IN FIELD.

SPEC NOTES:
1. POST LIGHT TO BE INSTALLED ON MATCHING FINISH POLE.
2. FINISH/COLOR : BLACK
3. MOUNTING HEIGHT : 16'
4. SEE PLAN/SCHEDULE FOR DISTRIBUTION TYPE.
5. WATTAGE TO BE SELECTED BY CONTRACTOR.

CONTRACTOR NOTES:
1. GENERAL CONTRACTOR TO COORDINATE AND PROVIDE CONDUIT PER LIGHTING SHOWN.
2. CONTRACTOR TO PROVIDE LIGHTING SUBMITTAL FOR FINAL APPROVAL BY OWNER AND LANDSCAPE ARCHITECT.
3. REFER TO MANUFACTURER FOR INSTALLATION INSTRUCTIONS.



PHOTOMETRICS AND LIGHTING CALCULATIONS PREPARED BY:

Rochelle Spahn - MIES
Specification Applications – PHL/NY/NNJ484 420 2305 D

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Fax: (610) 918-9003

PENNSYLVANIA PATRICK J. STUART REGISTERED LANDSCAPE ARCHITECT LA003025

Schedule

Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Number Lamps	Lumens Per Lamp	Light Loss Factor	Wattage
○	A	87	Lumenpulse	ALG71(XX)-120/277-CSL-S60-30K-CRI 80-3		1	4910	0.95	55
○	A2	13	Lumenpulse	ALG71(XX)-120/277-CSL-M80-30K-CRI 80-4		1	5882	0.95	64
○	A2-BLS	3	Lumenpulse	ALG71(XX)-120/277-CSL-M80-30K-CRI 80-4 BLS	Allegra Small	1	3132	0.95	64

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
ROAD A	X	2.1 fc	4.3 fc	0.8 fc	5.4:1	2.6:1
ROAD A - ROUNDABOUT	X	1.4 fc	3.3 fc	0.6 fc	5.5:1	2.3:1
ROAD B	X	1.6 fc	3.9 fc	0.7 fc	5.6:1	2.3:1
ROAD C	X	1.8 fc	4.5 fc	0.5 fc	9.0:1	3.6:1
ROAD D	X	1.8 fc	4.3 fc	0.5 fc	8.6:1	3.6:1
ROAD E	X	1.6 fc	4.0 fc	0.6 fc	6.7:1	2.7:1
AREA	+	0.1 fc	4.5 fc	0.0 fc	N/A	N/A

Note
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LIGHTING PLAN
SCALE: 1"=50'

50 0 25 50 100
GRAPHIC SCALE
1 inch = 50 feet

REV.	DATE	DESCRIPTION
1	6-14-23	PER TOWNSHIP ENGINEER COMMENTS
2		
3		
4		
5		
6		
7		
8		

CONDITIONAL USE
LIGHTING PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD WESTTOWN TWP., CHESTER COUNTY, PA

DATE: 04/17/23
SCALE: 1"=50'
DRAWN BY: JPL
CHECKED BY: PJS
PROJECT NO.: 3868
CAD FILE: 20230616_STOKES_TLP.dwg
PLOTTED: 06/14/23
DRAWING NO.: C07.3
SHEET 31 OF 37

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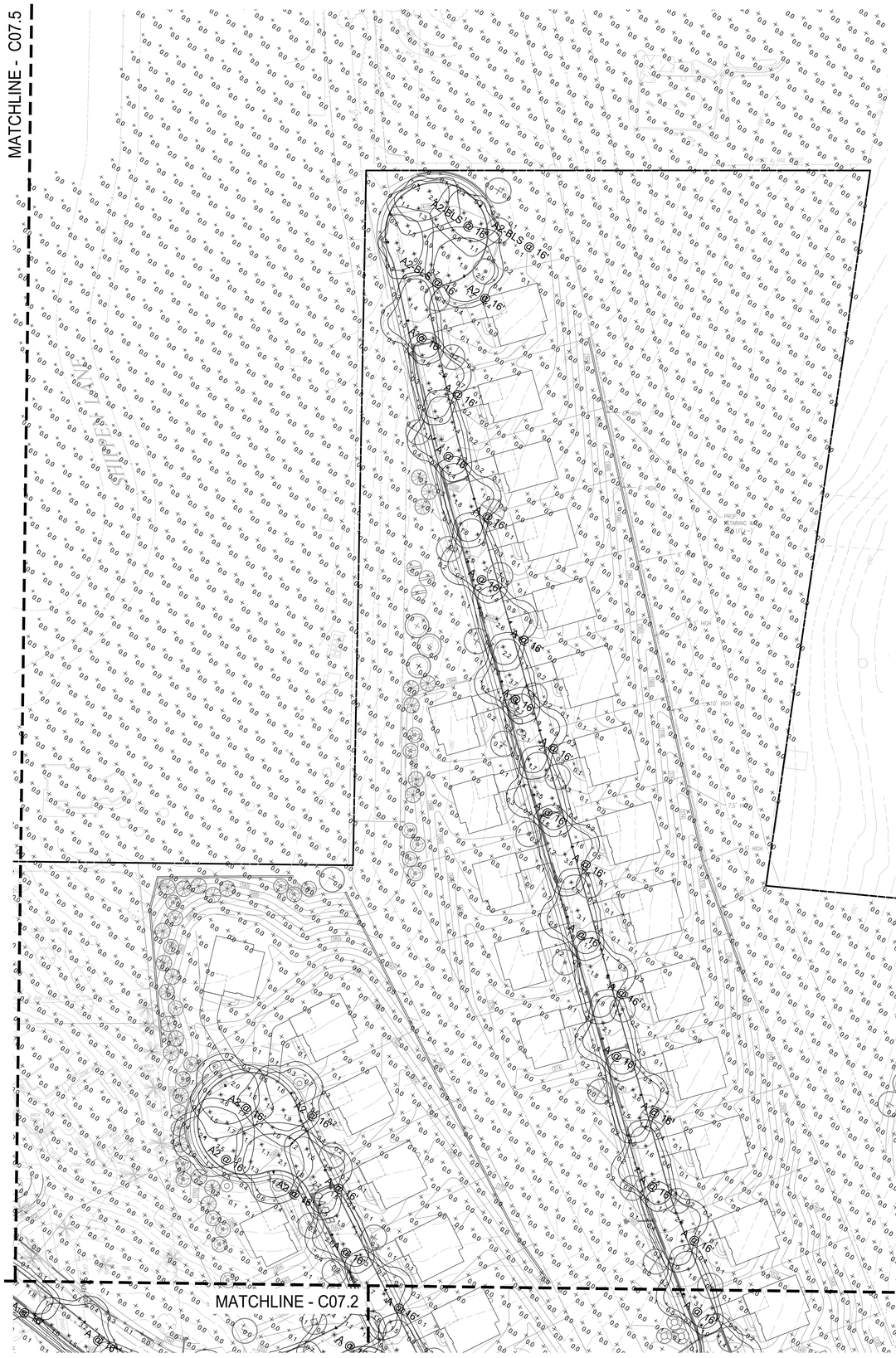

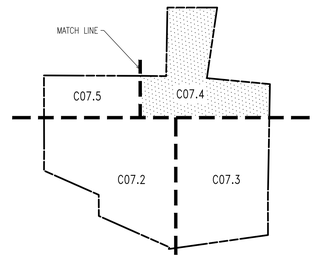

KEY MAP
N.T.S

Schedule									
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PHOTOMETRICS AND LIGHTING CALCULATIONS PREPARED BY:
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Specification Applications – PHL/NY/NNJ484 420 2305 D

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SITE PLAN NOTES:

1. ALL LINES AND GRADE WORK NOT PRESENTLY ESTABLISHED AT THE SITE SHALL BE LAID OUT BY A REGISTERED LAND SURVEYOR OR PROFESSIONAL CIVIL ENGINEER EMPLOYED BY THE CONTRACTOR IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
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COMMONWEALTH OF PENNSYLVANIA PATRICK J. STUART REGISTERED LANDSCAPE ARCHITECT

NO.	DATE	DESCRIPTION
1	6-14-23	PER TOWNSHIP ENGINEER COMMENTS
2		
3		
4		
5		
6		
7		
8		

CONDITIONAL USE
LIGHTING PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD
WESTTOWN TWP., CHESTER COUNTY, PA

DATE:	04/17/23
SCALE:	1"=50'
DRAWN BY:	JPL
CHECKED BY:	PJS
PROJECT NO.:	3868
CAD FILE:	20230616_STOKES_TLP.dwg
PLOTTED:	06/14/23
DRAWING NO.:	C07.4
SHEET	32 OF 37

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PHOTOMETRICS AND LIGHTING CALCULATIONS PREPARED BY:
Rochelle Spahn - MIES
Specification Applications – PHL/NY/NNJ 484 420 2305 D
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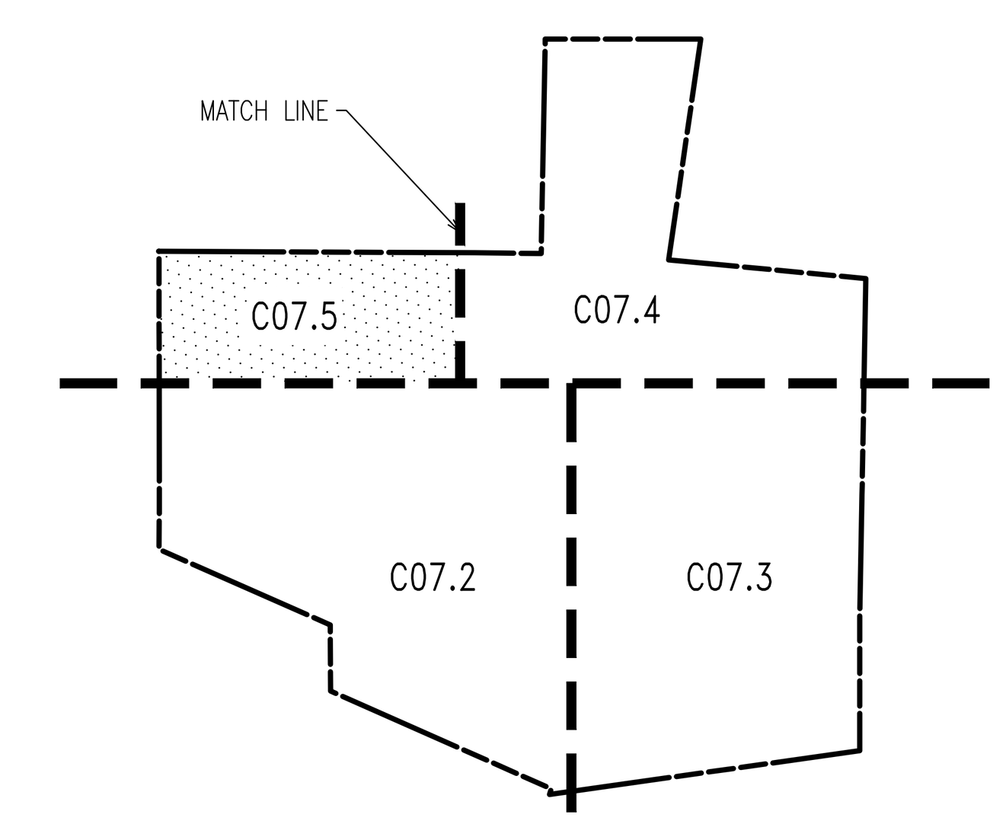

KEY MAP
N.T.S.

LIGHTING PLAN
SCALE: 1"=40'

50 0 25 50 100
GRAPHIC SCALE
1 inch = 50 feet

REV.	DATE	DESCRIPTION
1	6-14-23	PER TOWNSHIP ENGINEER COMMENTS

CONDITIONAL USE
LIGHTING PLAN

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD WESTTOWN TWP., CHESTER COUNTY, PA

DATE:	04/17/23
SCALE:	1"=50'
DRAWN BY:	JPL
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PROJECT NO.:	3868
CAD FILE:	20230616_STOKES_TLP.dwg
PLOTTED:	06/14/23
DRAWING NO.:	C07.5
SHEET	33 OF 37

LIGHTING AND LIGHTING SUBSTITUTION NOTES:

1. EXTERIOR LIGHTING HAS BEEN DESIGNED PER THE LIGHTING HANDBOOK OF THE ENGINEERING SOCIETY OF NORTH AMERICA (IESNA)
2. SELECTED FIXTURES TO BE FULL-CUT AND DARK SKY FRIENDLY.
3. THE TOWNSHIP MAY REQUIRE GLARE SHIELDING DEVICES, AT THE APPLICANT'S EXPENSES, IF DETERMINED APPLICABLE POST CONSTRUCTION.
4. THE TOWNSHIP RESERVES THE RIGHT TO CONDUCT ONE OR MORE POST-INSTALLATION NIGHTTIME INSPECTIONS TO VERIFY COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AND IF APPROPRIATE, TO REQUIRE SUITABLE REMEDIAL ACTION AT NO EXPENSE TO TOWNSHIP.
5. POST-APPROVAL ALTERATIONS TO LIGHTING PLANS OR INTENDED SUBSTITUTION FOR APPROVED LIGHTING EQUIPMENT SHALL BE SUBMITTED TO THE TOWNSHIP FOR REVIEW AND APPROVAL PRIOR TO INSTALLATION.
6. LIGHTING FIXTURES AND EQUIPMENT SHALL BE MAINTAINED SO AS TO CONTINUOUSLY MEET TOWNSHIP REQUIREMENTS.
7. ALL FIXTURES TO BE CONTROLLED WITH WIRELESS CONTROLLERS AND ALL SITE LIGHTING WILL BE REDUCED BY 75% FROM 11PM TO DAWN. NO OTHER LIGHTS SHALL BE PERMITTED AFTER 11PM.
8. ALL 120 VOLT CIRCUITS TO BE INSTALLED BY LICENSED ELECTRICIAN.
9. ALL 120 VOLT CABLE TO BE RUN IN CONDUIT.
10. CONTRACTOR TO PROVIDE SUFFICIENT NIGHTTIME ADJUSTMENT TO ALL LIGHTING TO SATISFY TOWNSHIP REQUIREMENTS AND OWNER OR OWNER'S REPRESENTATIVE.
11. ALL LIGHTING TO BE INSTALLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
12. ALL ELECTRICAL CONDUITS SHALL BE SCH. 40 PVC AND ALL BENDS SHALL BE SWEEP TYPE FOR PULLING WIRE. CONDUIT TO EXTEND BEYOND THE EDGE OF HARDSCAPE ELEMENTS BY 12" MIN. CONDUIT TO BE TEMPORARILY CAPPED AND LOCATIONS STAKED PRIOR TO BACKFILLING.
13. WHILE EXTENDING CONDUITS UNDER EXISTING STRUCTURE THE CONTRACTOR SHALL BE RESPONSIBLE FOR DAMAGE TO EXISTING STRUCTURES.
14. ALL SWITCHING CONTROL DEVICE TYPE AND LOCATIONS TO BE APPROVED BY OWNER OR OWNER'S REPRESENTATIVE.
15. ALL LIGHTING FIXTURES TO BE CONTROLLED BY AUTOMATIC SWITCHES TO PERMIT EXTINGUISHING LIGHT BETWEEN 11PM AND DAWN. ALL-NIGHT SAFETY OR SECURITY LIGHTING SHALL NOT HAVE LIGHTING INTENSITY LEVELS WHICH EXCEED 25% OF THE LEVELS NORMALLY PERMITTED BY THE TOWNSHIP BUT IN NO CASE SHALL THE INTENSITY LEVELS BE LESS THAN THE MINIMUM LEVELS FOR SAFETY AND SECURITY AS INVOKED BY THE IESNA.A11 FINAL LIGHT LOCATIONS TO BE APPROVED BY LANDSCAPE ARCHITECT.
16. CONTRACTOR TO ARRANGE A PRE-CONSTRUCTION MEETING WITH THE OWNER AND OWNER'S REPRESENTATIVES TO DISCUSS ALL UNDERGROUND UTILITIES. AS-BUILT DRAWINGS ARE REQUESTED OF ALL SUCH FACILITIES.
17. CONTRACTOR TO PREPARE A PLAN OF ALL AS-BUILT UNGROUNDED UTILITIES.
18. ALL FINAL LIGHT LOCATIONS TO BE FIELD ADJUSTED, AIMED AS NECESSARY SO AS TO AVOID SHINING OF LIGHT INTO WINDOWS AND DOORS. CONTRACTOR TO ARRANGE PRE-CONSTRUCTION MEETING WITH THE OWNER AND OWNER'S REPRESENTATIVES INCLUDING MASONS AND OTHER INDIVIDUALS FAMILIAR WITH ANY UNDERGROUND FACILITIES.
19. ALL WIRING, UP LIGHTING AND SPOT LIGHT LOCATIONS TO BE COORDINATED WITH TREES ON THE LANDSCAPE PLAN.
20. CONDUIT TRENCHING TO AVOID ROOT ZONES OF EXISTING TREES TO REMAIN.
21. ALL TRENCH LOCATIONS NEAR AND AROUND EXISTING TREES TO BE MARKED AND APPROVED BY LANDSCAPE ARCHITECT PRIOR TO COMMENCEMENT.
22. PROJECT ELECTRICAL ENGINEER TO PROVIDE POWER PLAN.
23. IN THE EVENT THAT THE CONTRACTOR PROPOSES LIGHT FIXTURE SUBSTITUTIONS, REQUEST MUST BE RECEIVED BY THE LANDSCAPE ARCHITECT FOR REVIEW (14) FOURTEEN DAYS PRIOR TO BID DATE TO PROVIDE AMPLE TIME FOR REVIEW AND TO ISSUE AN ADDENDUM INCORPORATING THE SUBSTITUTIONS. FAILURE TO SUBMIT WITHIN THAT DEADLINE RENDERS ALL SUBSTITUTIONS REQUESTS VOID, AND ORIGINALLY SPECIFIED FIXTURE(S) WILL BE SUPPLIED. THE CONTRACTOR SHALL SUBMIT THE FOLLOWING:
    - 23.1. TOWNSHIP REQUIRED COPIES OF ALL MANDATORY SUBMITTALS FOR BOTH THE ORIGINALLY SPECIFIED FIXTURE(S) AND THE PROPOSED SUBSTITUTION(S)
    - 23.2. CONTRACTOR'S WRITTEN CERTIFICATION THAT THE PROPOSED SUBSTITUTION(S) CONFORM TO ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS IN EVERY RESPECT AND IS APPROPRIATE FOR THE APPLICATION INDICATED IN THE DOCUMENTS.
    - 23.3. CONTRACTOR'S WRITTEN STATEMENT INDICATING THE EFFECT OF THE SUBSTITUTION(S) ON THE CONSTRUCTION SCHEDULE COMPARED TO THE SCHEDULE WITH THE ORIGINALLY SPECIFIED FIXTURE(S).
    - 23.4. CONTRACTOR-NET UNIT PRICE FOR THE ORIGINALLY SPECIFIED FIXTURE(S) AND FOR THE PROPOSED SUBSTITUTE FIXTURE(S).
    - 23.5. ONE SAMPLE OF THE PROPOSED SUBSTITUTION FIXTURE(S) WITH SPECIFIED LAMPS AND CORD AND PLUG CONNECTION FOR 277 VOLT OPERATIONS.
    - 23.6. CONTRACTOR'S WRITTEN CERTIFICATION THAT ANY ALTERATIONS THAT MAY RESULT FROM THE PROPOSED LIGHTING FIXTURE SUBSTITUTION(S) WILL BE DESIGNED AND CONSTRUCTED AT THE CONTRACTOR'S EXPENSE.
    - 23.7. REIMBURSEMENT TO THE LANDSCAPE ARCHITECT FOR ALL TIME ASSOCIATED WITH REVIEW OF FIXTURE SUBSTITUTIONS. PAYMENT SHALL BE MADE IN ADVANCE OF THE REVIEW, BASED ON THE LANDSCAPE ARCHITECT'S HOURLY RATES FOR THE PERSONAL INVOLVED IN THE REVIEW.
    - 23.8. CONTRACTOR'S WRITTEN WAIVER OF RIGHTS TO ADDITIONAL PAYMENT AND/OR TIME THAT MAY BECOME NECESSARY SHOULD THE PROPOSED SUBSTITUTION(S) FAIL TO PERFORM IN A MANNER THAT IS EQUIVALENT TO THE ORIGINALLY SPECIFIED FIXTURE(S).
    - 23.9. AS NOTED ABOVE, AN ADDENDUM INCORPORATING THE SUBSTITUTION SHALL INCORPORATE THE FOLLOWING REQUIREMENTS.
        - 23.9.1. ANY SUBSTITUTIONS TO LIGHTING FIXTURES AND THEIR PARTS MUST BE APPROVED BY THE OWNER, TENANT, TOWNSHIP, AND THE LANDSCAPE ARCHITECT. ANY COST ASSOCIATED WITH REVIEW AND APPROVAL OF THE SUBSTITUTIONS SHALL BE ENTIRELY BORNE BY THE CONTRACTOR.
        - 23.9.2. COMPUTER PREPARED LIGHTING PLANS AND PHOTOMETRIC LAYOUTS OF THE PROPOSED LIGHTING AREA WHICH INDICATES THE SYSTEM'S PERFORMANCE.
        - 23.9.3. A PHOTOMETRIC STUDY WITH REPORT NUMBER, DATE, FIXTURE CATALOG NUMBER, LUMINAIRE AND LAMP SPECIFICATIONS; IES CALCULATIONS, POINT BY POINT FOOT CANDLE PLAN, STATISTIC ZONES SHOWING AVERAGE, MAXIMUM, MINIMUM AND UNIFORMITY RATIOS, SUMMARY, ISOLUX PLOT, AND CATALOGUE CUTS. CATALOGUE CUTS MUST IDENTIFY OPTICS, LAMP TYPE, DISTRIBUTION TYPE, REFLECTOR, LENS, BALLASTS, WATTAGE, VOLTAGE, FINISH HOUSING DESCRIPTION AND ALL OTHER PERTINENT INFORMATION.
        - 23.9.4. POLE MANUFACTURER AASHTO CALCULATIONS INDICATING THE POLE AND ANCHOR BOLTS BEING SUBMITTED ARE CAPABLE OF SUPPORTING THE POLE AND FIXTURE SYSTEMS BEING UTILIZED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
        - 23.9.5. A PHOTOGRAPH THAT CLEARLY ILLUSTRATES THE REPLACEMENT FIXTURE MOUNTED NOTING THE COLOR, FINISH, MANUFACTURER, AND ADDITIONAL PHYSICAL CHARACTERISTICS.
24. THE LIGHTING CALCULATIONS AND PHOTOMETRICS WERE PREPARED BY REGISTERED LIGHTING DESIGNER, ROCHELLE SPAHN, MIES. (CERTIFIED WITH ILLUMINATING ENGINEER SOCIETY AND INTERNATIONAL ASSOCIATION LIGHTING DESIGNERS).

SPEC NOTES:
1. POST LIGHT TO BE INSTALLED ON MATCHING FINISH POLE.
2. FINISH/COLOR : BLACK
3. MOUNTING HEIGHT : 16'
4. SEE PLAN/SCHEDULE FOR DISTRIBUTION TYPE.
5. WATTAGE TO BE SELECTED BY CONTRACTOR.

CONTRACTOR NOTES:
1. GENERAL CONTRACTOR TO COORDINATE AND PROVIDE CONDUIT PER LIGHTING SHOWN.
2. CONTRACTOR TO PROVIDE LIGHTING SUBMITTAL FOR FINAL APPROVAL BY OWNER AND LANDSCAPE ARCHITECT.
3. REFER TO MANUFACTURER FOR INSTALLATION INSTRUCTIONS.

SITE PLAN NOTES:

1. ALL LINES AND GRADE WORK NOT PRESENTLY ESTABLISHED AT THE SITE SHALL BE LAID OUT BY A REGISTERED LAND SURVEYOR OR PROFESSIONAL CIVIL ENGINEER EMPLOYED BY THE CONTRACTOR IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
2. THIS PLAN TO BE USED FOR LANDSCAPING AND SITE IMPROVEMENT PURPOSED ONLY.
3. PLANS CREATED FROM DRAWINGS FROM DL HOWELL ENGINEERING DATED, 04/12/2023.
4. LOCATION OF ALL UNDERGROUND UTILITIES SHALL BE VERIFIED AND MARKED IN THE FIELD, PRIOR TO ANY DIGGING OPERATIONS.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING EXISTING TREES AND PLANT MATERIAL WITHIN THE AREA OF PROPOSED IMPROVEMENTS.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR DISPOSING OF ALL DEBRIS OFF-SITE, CLEAN-UP OF ALL PAVED AREAS (ROADWAYS, SIDEWALKS, ETC.); AND RESTORATION OF ALL DISTURBED LAWN AREAS.
7. CONTRACTOR SHALL BE RESPONSIBLE TO REPAIR ANY DAMAGE TO UNDERGROUND UTILITIES DAMAGED.
8. CONTRACTOR SHALL PROVIDE SCREENED PLANTING SOIL WHERE PLANTING IS TO OCCUR. 36" DEPTH. 6" DEPTH AT LAWN AREAS.
9. FOLLOWING COMPLETION OF ALL PLANTING INSTALLATION WORK, THE CONTRACTOR SHALL BE REQUIRED TO RESTORE ALL DISTURBED LAWN AREAS.
10. NO TREE SHALL BE PLANTED CLOSER THAN 10 FEET FROM AN UNDERGROUND UTILITY.
11. ALL LINES ARE PARALLEL OR PERPENDICULAR UNLESS SHOWN OTHERWISE.
12. VERIFY LAYOUT OF ALL PROPOSED WORK TO EXISTING CONDITIONS. REPORT DISCREPANCIES BEFORE ANY CLEARING OR EXCAVATION IS DONE.
13. PROVIDE STAKED LAYOUT ON SITE FOR OWNER AND LANDSCAPE ARCHITECT'S REVIEW PRIOR TO COMMENCING WORK.
14. ALL DIMENSIONS SHOWN ARE TO FACE OF MATERIALS, UNLESS SHOWN OTHERWISE.
15. PLEASE NOTE, CLIENT DID NOT RETAIN STUART AND ASSOCIATES, LLC.. TO PROVIDE LONG TERM MAINTENANCE SPECIFICATIONS FOR THE LANDSCAPE MATERIAL.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING PA ONE CALL AND LOCATING ALL UNDERGROUND UTILITIES BEFORE ANY DIGGING OR PLANT REMOVAL OCCURS.
17. CONTRACTOR SHALL INSTALL SILT FENCE IN ANY AREAS WHERE SOIL MAY RUNOFF INTO PARKING AREAS OR INTO EXISTING INLETS.
18. FOLLOWING THE COMPLETION, THE EXISTING VEGETATION WILL BE INSPECTED FOR HEALTH AND QUALITY, AND IF NOT DEEMED IN GOOD CONDITION, REPLACED WITH THE EQUIVALENT COMPENSATORY PLANTINGS.
19. V.I.F. = VERIFY IN FIELD.

PHOTOMETRICS AND LIGHTING CALCULATIONS PREPARED BY:
Rochelle Spahn - MIES
Specification Applications – PHL/NY/NNJ484 420 2305 D

illuminations

1157 Phoenixville Pike, Suite 105 | West Chester, PA 19380
5 Pennsylvania Plaza, 24th Floor | New York, NY 10001
www.illuminationsinc.com

stuart
LANDSCAPE ARCHITECTS
PLANNERS | DESIGNERS

DLHowell
Civil Engineering
Land Planning
Environmental
www.DLHowell.com

1250 Wrights Lane
West Chester, PA 19380
Phone: (610) 918-9002
Fax: (610) 918-9003

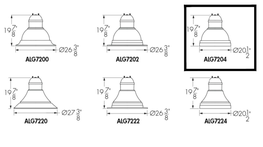
Schedule										
Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Number Lamps	Lumens Per Lamp	Light Loss Factor	Wattage
○	A	87	Lumenpulse	ALG71(XX)-120/277-CSL-S60-30K-CRI 80-3		1	4910	0.95	55
○	A2	13	Lumenpulse	ALG71(XX)-120/277-CSL-M80-30K-CRI 80-4		1	5882	0.95	64
○	A2-BLS	3	Lumenpulse	ALG71(XX)-120/277-CSL-M80-30K-CRI 80-4 BLS	Allegra Small	1	3132	0.95	64

Statistics						
Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min
ROAD A	+	2.1 fc	4.3 fc	0.8 fc	5.4:1	2.6:1
ROAD A - ROUNDABOUT	+	1.4 fc	3.3 fc	0.6 fc	5.5:1	2.3:1
ROAD B	+	1.6 fc	3.9 fc	0.7 fc	5.6:1	2.3:1
ROAD C	+	1.8 fc	4.5 fc	0.5 fc	9.0:1	3.6:1
ROAD D	+	1.8 fc	4.3 fc	0.5 fc	8.6:1	3.6:1
ROAD E	+	1.6 fc	4.0 fc	0.6 fc	6.7:1	2.7:1
AREA	+	0.1 fc	4.5 fc	0.0 fc	N/A	N/A

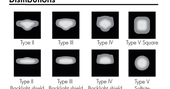
Note
1. MOUNTING HEIGHT AT 16'
2. CALCULATIONS TAKEN AT GRADE
3. CALCULATIONS ARE ESTIMATIONS BASED ON THE INFORMATION PROVIDED AND MAY VARY WITH ACTUAL CONDITIONS

Configured Specification Sheet — allegra, Allegra Medium

Project Name STOKES Qty
Type ALLEGRA Catalog / Part Number ALG7204 120 CSL 30K CRI80 R4TX DIM



Distributions



Colors and Color Temperatures

Controls
ON/OFF 0-10V

Rating
IP66 (optical chamber)

Certifications

Description

The Allegra Medium is a durable, stylish luminaire for urban lighting applications, including pedestrian plazas, residential streets and collector roads. Offering a choice of outputs, color temperatures, and distributions, the Allegra Medium is elegance personified.

Features

Color and Color Temperature	2200K, 2700K, 3000K, 3500K, 4000K, 5700K
Distributions	Type II, Type III or Type IV (with or without backlight shield), Type I square and Type V Softsite
Options	Corrosion-resistant coating for hostile environments, Surge protector
Mounting Options	Pendant Medium (4-Bolt Tenon Adaptor), Side Internal (2 3/8 in Tenon)
Warranty	5-year limited warranty

Performance

Output (nominal lumens)	Minimum 3000lm / Maximum 17000lm
Color Rendering	3 SDCM for CRI 70+ and 2 SDCM for CRI 80+
Lumen Maintenance	TM-21 L70 527,000 hrs (projected, Ta 77 °F), 36,000 hrs (reported, Ta 77 °F)
Dark Sky	Dark sky compliant (2200K, 2700K and 3000K color temperatures, BUG rating of U0)

Physical

Housing Material	Die cast low copper 360 aluminum alloy
Lens Material	Optical tempered clear glass (Clearsite lens), Optical tempered opal glass (Softsite lens)
Weight	Up to 35 lbs
EPA	Up to 1.13 sq ft

2 POST LIGHT CUTSHEET
SCALE : N.T.S.

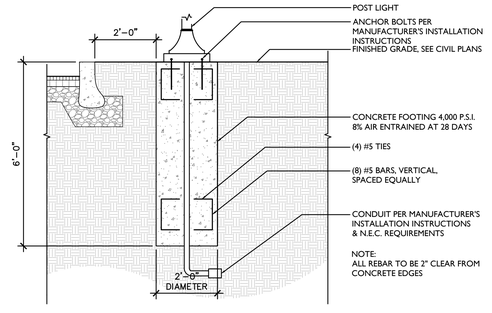
Configured Specification Sheet — allegra, Allegra Medium

How to order

ALG7204	120	CSL	540	30K	CRI 80	2	R4TX	DIM	C8C	P4
Housing [1]	Voltage	Lens	Output (nominal lumens)	Color and Color Temperature [2]	Color Rendering	Distributions	Finish	Control	Options	Mounting Options
ALG7200 Allegra 7200	120 120 volts	CSL Clearsite lens [3] [4]	540 4000lm [4]	22K 2200K [4]	CRI 70 CRI 70+ [4]	2 Type II	BK Black Sandfed®	DIM 0-10V dimming [5]	C8C Corrosion-resistant coating for hostile environments	P4 Pendant Medium (4-Bolt Adaptor)
ALG7202 Allegra 7202	208 208 volts	SSL Softsite Beta [4] [6]	560 4000lm	27K 2700K [4]	CRI 80 CRI 80+ [7]	2BLS Type II Backlight shield	BRZ Bronze Sandfed®		SP Surge protector	R2 Side Internal (2 3/8 in Tenon)
ALG7204 Allegra 7204	240 240 volts	M80 9000lm	30K 3000K		3 Type III	SI Silver Sandfed®				
ALG7220 Allegra 7220	277 277 volts	M110 11000lm	35K 3500K		3BLS Type III Backlight shield	MTEX Textured black				
ALG7222 Allegra 7222	347 347 volts	M150 15000lm	40K 4000K		4 Type IV	WHTEX Textured bronze non-metallic				
ALG7224 Allegra 7224	480 480 volts	L170 17000lm	57K 5700K		4BLS Type IV Backlight shield	GRATEX Textured medium-gray				
	CONTRACTOR TO VERIFY	L30 3000lm Softsite [4]			5 Type V square	GRNTEX Textured green				
		L50 5000lm Softsite [4]			6 Type V Softsite	WHTEX Textured white				
		L70 7000lm Softsite [4]			SEE LUMINAIRE SCHEDULE	CC Custom color and finish (please specify RAL color) [11] [12]				

Notes:
1. Consult Sealmax Products section on webpage for a selection of compatible decorative arms, decorative poles (sold separately).
2. Available with 540, 560, M80, M110, M150 and L170 output option only.
3. Available with types II, 2BLS, 3, 3BLS, 4, 4BLS and 5S distribution only.
4. Available with R4TX finish and DIM options only.
5. Available with type 4 distribution only.
6. Available up to 57°K.
7. Consult factory for more color temperature options.
8. Available for C8 SD only.
9. Binning within a 3-step MacAdam ellipse, with the exception of 2200K and 5700K.
10. Binning within a 4-step MacAdam ellipse, with the exception of 5700K.
11. Specify RAL number followed by "TX" for textured finish (ex: RAL9005TX) or STX for Sandfed finish (ex: RAL9005STX). Textured or Sandfed finishes are recommended for the availability of all products. If a finish is not specified with the RAL number (ex: RAL9005), a gloss finish will be provided. Please consult factory for other RAL textures and glosses, or to match alternate color standards (i.e. Pantone, Benjamin Moore, etc.).
12. Setup charges apply for ALL colors. Consult factory for details.
13. Longer lead times can be expected for custom RAL color finishes.
14. Dim control can be used as HID (on/off) control if no dim is required.
15. Low only when exposed to cold temp. This option is not required for normal outdoor exposure.
16. Setup charges apply. Consult factory for details.

3 POST LIGHT CUTSHEET CONT.
SCALE : N.T.S.



1 POST LIGHT FOOTING DETAIL, TYP.
SCALE : 1/2" = 1'-0"

CONDITIONAL USE

LIGHTING DETAILS AND NOTES

CLIENT: FOX CLEARING, LLC
PROJECT: STOKES PROPERTY
LOCATION: 1013 SHILOH ROAD
WESTTOWN TWP., CHESTER COUNTY, PA

NO.	DATE	DESCRIPTION
1	6-14-23	PER TOWNSHIP ENGINEER COMMENTS
2		
3		
4		
5		
6		
7		
8		

DATE: 04/17/23
SCALE: VARIES
DRAWN BY: JPL
CHECKED BY: PJS
PROJECT NO.: 3868
CAD FILE: 20230616_STOKES_TLP.dwg
PLOTTED: 06/14/23
DRAWING NO.: C07.6
SHEET: 34 of 37